REPORT OF AN APPLICATION OF ATLANTIC RICHFIELD COMPANY, CITIES SERVICE ATHABASCA, INC., IMPERIAL OIL LIMITED AND ROYALITE OIL COMPANY, LIMITED UNDER PART VI A OF THE OIL AND GAS CONSERVATION ACT

DECEMBER 1968

OIL AND GAS CONSERVATION BOARD
603 SIXTH AVENUE SOUTH WEST • CALGARY 1, ALBERTA

REPORT OF AN APPLICATION OF ATLANTIC RICHFIELD COMPANY, CITIES SERVICE ATHABASCA, INC., IMPERIAL OIL LIMITED AND ROYALITE OIL COMPANY, LIMITED UNDER PART VI A OF THE OIL AND GAS CONSERVATION ACT

DECEMBER 1968

OIL AND GAS CONSERVATION BOARD

603 SIXTH AVENUE SOUTH WEST • CALGARY 1, ALBERTA

PRICE $2.00

TABLE OF CONTENTS

I INTRODUCTION

The Application

The subject application of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited, was heard by the Oil and Gas Conservation Board with G. W. Govier, P. Eng., A. F. Manyluk, P. Eng. and Vernon Millard sitting. The hearing took place on June 3 and August 6, 7, 8, 9, 12, 13, 14, 15, 16 and 19, 1968, and the parties were allowed until September 19, 1968, to file written arguments.

The applicants propose to produce over a 25-year period commencing in 1973, 18,250,000 barrels per year of synthetic crude oil, 9,125,000 barrels per year of specialty oils, and 1,825,000 barrels per year of attendant naphtha from Lease 17 in Townships 92 and 93, Ranges 10, 11 and 12, West of the 4th Meridian, in the Bituminous Sands area of Alberta. Details of the application are given in Section II of this report.

The application followed one, heard by the Board in 1963, made on behalf of Cities Service Athabasca, Inc., Imperial Oil Limited, Richfield Oil Corporation (which subsequently entered into a merger to form Atlantic Richfield Company) and Royalite Oil Company, Limited. Following the 1963 hearing, the Board, with the approval of the Lieutenant Governor in Council, gave a decision in accordance with its report on the application[1]

---

(1) Report to the Lieutenant Governor in Council with respect to the Applications of Cities Service Athabasca, Inc. and Shell Canada Limited, October, 1963.

where it stated:

"The Board finds that the application for the production of 100,000 barrels per day of synthetic crude oil commencing in approximately 1970 cannot be approved at this time. Since, however, the Board is convinced of the ultimate desirability of authorizing further production from the oil sands and is impressed with the experimental work done by the applicants, it does not believe that the application should be dismissed and, subject to the approval of the Lieutenant Governor in Council, defers its final consideration of the application and continues the application and is prepared to reconsider it in its present, or an amended, form upon the applicants satisfying the Board that there is a reasonable possibility of the applicants being able to demonstrate that

(a) if the application or amended application were granted the conventional crude oil industry in Alberta would, at the end of 24 months of commercial operation of the project proposed, be able to operate at or above a percentage of its productive capacity consistent with the Board's interpretation, as discussed in this report, of Government policy, or

(b) the application or amended application could be granted without the total oil sands production in market competition with conventional crude oil, at the end of 24 months of commercial operation of

the project proposed, exceeding 5 per cent of the total market demand for Alberta light and medium crude oil including synthetic crude oil;

provided, however, that if the applicants do not file with the Board on or before December 31, 1968, a request for reconsideration, the application shall be deemed to be dismissed.

"Further, the Board, with the approval of the Lieutenant Governor in Council, is prepared to give a reconsideration of the application or amended application requested on or before December 31, 1968, preferential consideration over comparable applications from others except for applications for reconsideration filed prior to or approximately concurrently with such an application from Great Canadian Oil Sands Limited or Shell Canada Limited."

The present proceeding is the earlier application in an amended form, of which the applicants have now requested a reconsideration.

Government Policy

In 1963 the original application was considered in the light of the "Government Policy Statement with respect to Oil Sands Development". This statement had been issued by Premier E. C. Manning in October, 1962.

On February 20, 1968, Premier Manning tabled in the Legislative Assembly of the Province, a further statement "Oil Sands Development Policy". The new statement modifies the 1962

policy statement. Early in the hearing the Chairman stated that the Board considers that the revisions of policy make it unnecessary for the Board to be satisfied on the matters referred to in the 1963 disposition of the original application before reconsidering the application or an amended form of it.

Section IV and Appendix A contain details of the Government Policy and statutory provisions regarding commercial oil sands development.

The Applicants

Each of the applicants has a 30 per cent interest in the proposed project, except Royalite Oil Company, Limited which has a 10 per cent interest. In December, 1964, the applicants caused Syncrude Canada Ltd. to be incorporated in Alberta. It is a non-profit company whose purpose is carrying out research and commercial development of the Athabasca oil sands, and it would be the operator for the applicants.

Something of the identity of the applicants must be known to understand their proposals for marketing synthetic crude oil.

Imperial Oil Limited is an integrated oil company engaged in exploration, production, refining and marketing in Canada. Slightly less than 70 per cent of its share capital is held by Standard Oil Company of New Jersey. Imperial's proposed purchaser, Humble Oil and Refining Company, is a wholly owned subsidiary of Standard Oil Company of New Jersey and is an integrated oil company operating throughout the United States.

Atlantic Richfield Company carries on exploration and production operations in this country and it, or its parent company, is an integrated oil company in the United States.

Cities Service Athabasca, Inc. is a subsidiary of Cities Service Company, as are Canada-Cities Service Petroleum Corp. and Cities Service Oil Company. Canada-Cities Service Petroleum Corp. is engaged in exploration and production operations in Canada. The proposed purchaser, Cities Service Oil Company, is a fully integrated oil company operating in the United States and having outlets in 29 states east of the Mississippi River.

Royalite Oil Company, Limited is a 97.6 per cent subsidiary of The British American Oil Company Limited, and they are fully integrated oil companies operating in Canada. Gulf Oil Corporation, which owns about 69 per cent of the common stock of The British American Oil Company Limited, is a fully integrated company and it is through it that Royalite proposes to market its share of synthetic crude oil.

Appearances

The persons named in Table 1 appeared at the hearing.

BP Petroleum, British Petroleum, Home, Texaco, Triad, Pan American and Hudson's Bay appeared for the purposes of cross-examination and argument, and of them only Pan American and Hudson's Bay filed arguments. Arguments were also filed by the applicants, Chevron Standard, Canadian Fina, IPAC, Mobil and Great Plains.

TABLE 1

APPEARANCES

	Abbreviation of Name Used in Report	Represented by	Witnesses
Syncrude Canada Ltd.	Syncrude	J.H. Laycraft, Q.C.	G. A. Connell, P.Eng. (of The British American Oil Company Limited)
Atlantic Richfield Company	Atlantic Richfield		R. G. Daniel (of Atlantic Richfield)
Cities Service Athabasca, Inc.	Cities Service		G. R. Gray, P.Eng. (of Syncrude)
Imperial Oil Limited	Imperial		D. R. Hamilton, Jr. (of Cities Service Oil Company)
Royalite Oil Company, Limited	Royalite		R. E. Harris (of The British American Oil Company Limited)
			J. A. Haston, P. Eng. (of Syncrude)
			R. I. Hoskins (of Gulf Oil Corporation)
			W. F. Kieschnick, Jr. (of Atlantic Richfield)
			R. M. Maier (of Imperial)
			N. M. Smirlock (of Atlantic Richfield)
			F. K. Spragins, P.Eng. (of Syncrude)
			J. G. Yeager (of Humble Oil and Refining Company)

TABLE 1 (Continued)

	Abbreviation of Name Used in Report	Represented by	Witnesses
Chevron Standard Limited	Chevron	R. J. Gibbs	A. B. Bristow, Jr., P.Eng. E. J. Cahill (of Standard Oil Company of California) L. F. Schimansky (of Standard Oil Company of California)
Banff Oil Ltd.	Banff	G.J.Last, P.Eng.	G. J. Last, P. Eng. (of Banff Oil Ltd.)
Aquitaine Company of Canada Ltd.	Aquitaine		
BP Petroleum Development North America Inc.	BP Petroleum	E. W. Wellbaum	
The British Petroleum Company of Canada Limited	British Petroleum	L. E. Barchid	
Canadian Fina Oil Limited	Canadian Fina	G. W. Brown	D. S. Harvie, P. Eng.
Dome Petroleum Limited	Dome	W. E. Richards J. A. R. Dube C. S. Dunkley, P.Eng.	C. S. Dunkley, P. Eng.
Great Canadian Oil Sands Limited	Great Canadian	B. V. Massie, Q.C.	R. Burk (of Sun Oil Company Limited)
Home Oil Company Limited	Home	M. P. Paulson, P.Eng.	
Hudson's Bay Oil and Gas Company Limited	Hudson's Bay	R. A. MacKimmie, Q.C.	

TABLE 1 (Continued)

	Abbreviation of Name Used in Report	Represented by	Witnesses
Independent Petroleum Association of Canada	IPAC	J. B. Ballem, Q.C.	(H. Booth ((of Pembina Pipe Lines Ltd.) (M.P.Paulson, P.Eng. ((of Home) (W. C. Rich, Jr. ((of Purvin and Gertz Inc.)
Mobil Oil Canada, Ltd.	Mobil	D. W. MacFarlane	(D. D. Brown, P.Eng. (B. H. Templeton ((of Mobil Oil Corporation)
Pan American Petroleum Corporation	Pan American	W. G. Trimble,P.Eng.	
Texaco Exploration Company	Texaco	(R. Pike (W. S. Kolodinsky,P.Eng.	
Town of Fort Smith	Fort Smith	R. S. Westbury,P.Geol.	D. W. Ferrier, P. Eng. (of L.G. Grimble & Associates Ltd.)
Triad Oil Co. Ltd.	Triad	M. W. Clegg	
Great Plains Development Company of Canada, Ltd.	Great Plains	M. E. Lomas	P. Podmaroff, P.Eng.
Board Staff		(N. A. Macleod, Q.C. (G. C. Watkins (H. J. Webber, P.Eng. P. Melson (of Department of Mines and Minerals)	

II SUBMISSION OF APPLICANTS

General

The applicants propose a mining, extraction and upgrading scheme to produce hydrocarbon products and sulphur from Crown Lease No. 17 at Mildred Lake in the Athabasca oil sands deposit. The locations of the initial mining area and other major facilities are shown in Figure 1. The products which would be produced are 50,000 barrels per day of synthetic crude oil, 25,000 barrels per day of specialty oils and 5,000 barrels per day of naphtha. The properties of the products are discussed later. Some 472 long tons per day of elemental sulphur would be recovered from gaseous streams from the upgrading process.

Prior to the commencement of full scale production operations, the applicants would divert Beaver Creek around the proposed initial mining area, as shown in Figure 1, and would construct necessary plant, waste disposal and water handling facilities.

The applicants propose to use motorized scrapers for the overburden removal and mining operations. Oil sands would be conveyed to an extraction plant where the crude bitumen would be separated from the mineral matter by a modified hot water process and then dehydrated. The sand tailings would be pumped with water to disposal facilities.

The crude bitumen would be upgraded by the H-Oil Hydrovisbreaking process and by further hydrogenation.

Process gas and the heavy residual oil from hydrovisbreaking would be used as fuel for the project.

The hydrocarbon product streams would be transported in batches by pipe line to markets which are generally not defined at this time but which, the applicants contended, would be in accord with the Alberta Oil Sands Development Policy.

There have been a number of important changes - technical, economic and corporate - in the project since it was deferred by the Board with the approval of the Lieutenant Governor in Council after the 1963 hearing. The major changes are:

(1) Syncrude Canada Ltd., a non-profit cost company, was incorporated in 1964 by the applicants for the sole purpose of carrying out research and commercial development of the proposed project.

(2) The total liquid hydrocarbon production for which application was made was decreased from 100,000 to 80,000 barrels per day.

(3) The initial mining area and the major components of the project have been relocated within the lease. The former site of the initial mining and plant areas is shown on Figure 1 for comparison purposes.

(4) Scrapers have replaced bucket wheel excavators for the mining of oil sands.

(5) The extraction treatment technology would now provide for a 93 per cent recovery of bitumen as compared with 85 per cent in the previous proposal.

(6) The H-Oil Hydrovisbreaking process would be used in place of a fluid coking process for the initial bitumen upgrading.

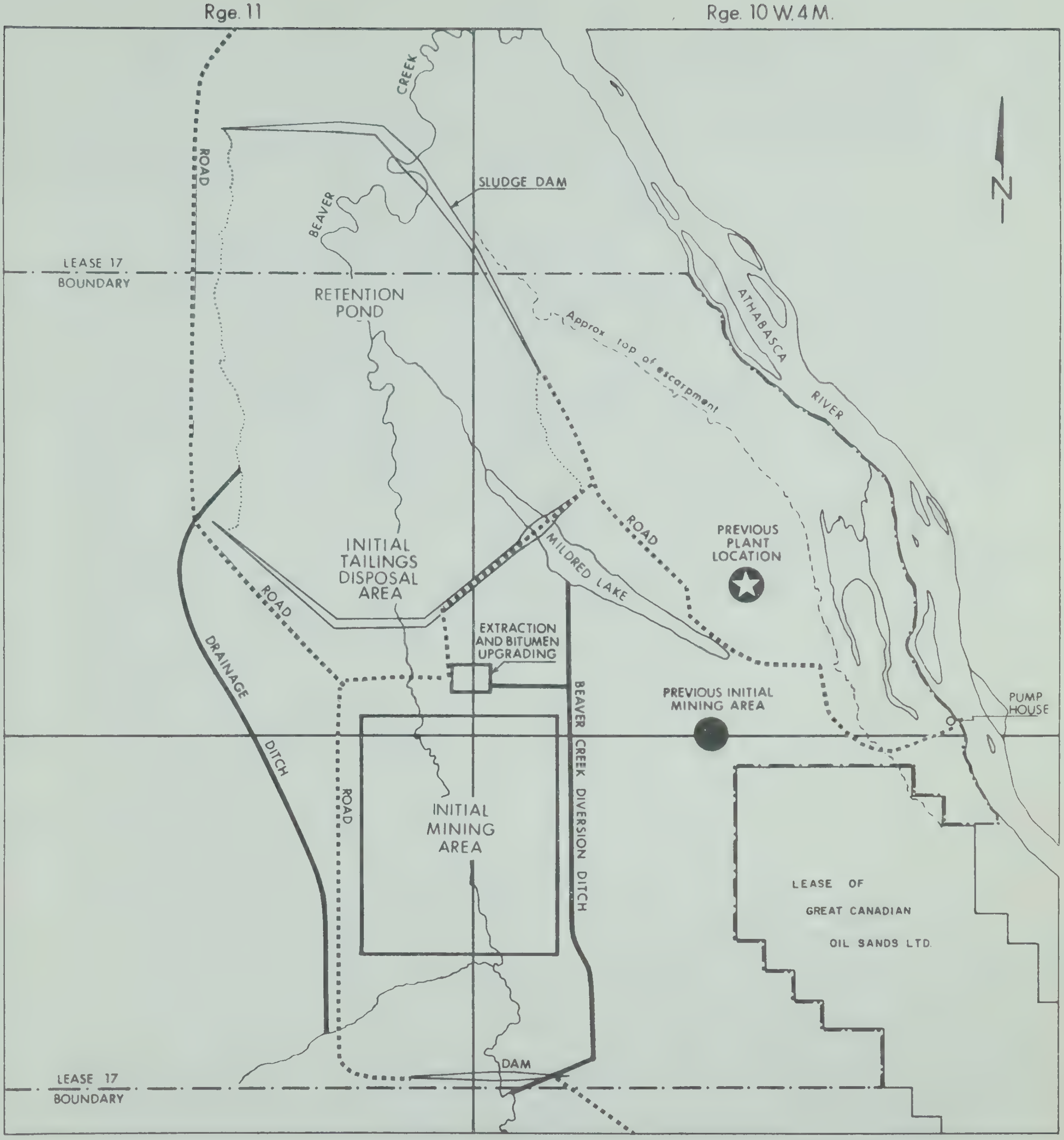


FIGURE 1 - GENERAL PLAN OF PROPOSED PROJECT OF SYNCRUDE CANADA LTD.
(Most areas shown are approximate)

SCALE: 0 1 2 miles

OIL AND GAS CONSERVATION BOARD
CALGARY, ALBERTA NOVEMBER, 1968

(7) The overall recovery of liquid hydrocarbon products would now be 74 volume per cent for the initial mining area as compared with 60.5 per cent in the previous proposal.

Ownership of Oil Sands and Other Rights

The applicants are the lessees of Bituminous Sands Lease No. 17, from which the oil sands would be mined. They also hold surface leases on Lease No. 17 and on the adjoining property to the east and north which would be required for water supply and retention pond facilities. Syncrude has received assurance from the Water Resources Division of the Alberta Department of Agriculture that the applicants' proposals for water diversion, storage and supply would be granted subject only to the usual provisions of The Water Resources Act. Syncrude has applied for licence of occupation for the land south of Lease 17 which would be flooded by the damming of Beaver Creek.

Research and Experimental Background

After the deferral of the decision on the application in 1963, the applicants shut down the pilot plant facilities in the Athabasca area and established Syncrude's major laboratory in Edmonton. The scope of work conducted there included basic research on oil sands. The applicants contend that significant improvements in bitumen extraction recoveries have resulted from these studies.

As a result of a continued drilling program a new prime mining area having a low ratio of overburden to oil sand feed

was located in the vicinity of Beaver Creek. Laboratory extraction tests indicate, according to the applicants, that the oil sands in the new area have superior properties in regard to bitumen extraction recovery.

Developments in mining equipment and technology led the applicants to conduct major field tests of self-loading and conventional scrapers for overburden removal and mining of oil sands. Commercial machines were tested on a variety of materials under all climatic conditions and, the applicants state, were found to perform satisfactorily.

The applicant submitted that continued studies of bitumen conversion processes have shown that the H-Oil Hydrovisbreaking process is very attractive in terms of economics, product yield and flexibility in product properties. The H-Oil Hydrovisbreaking process was recently developed by Cities Service and Hydrocarbon Research, Inc. and would be used in the proposed scheme.

Although conversion of bitumen from the Athabasca deposit by the proposed process has not been proved on a commercial scale, laboratory and pilot runs by the applicants at rates of one to 25 barrels per day have been conducted over a period representing two to three years of continuous operation.

The applicants estimate that their cumulative expenditures to 1968 on research and development are $27,000,000. This represents an increase of $8,000,000 over that reported at the time of the original application.

According to the applicants, if approval of the application should be granted, additional pilot work for the purposes of scaling and design would be done. The basic processes are considered to be selected, however, and no work on other processes is foreseen in preparation for construction of the proposed project.

Reserves

During the first 14 years of operation, oil sands would be obtained from the initial mining area shown on Figures 1 and 2. This area is centred near the south-east corner of Section 36, Township 92, Range 11, West of the 4th Meridian, approximately four miles from the Athabasca River. The applicants' tentative future mining plans are to proceed southward to the lease line through the area marked A on Figure 2 and then through areas B, C and D. The operations would be in their 25th year soon after mining had commenced in Area B.

The applicants currently consider the areas marked U1, U2 and U3 on Figure 2 unmineable because of excessive ratios of overburden to oil sands feed.

The properties and reserves of the first three mining areas are tabulated below. The figures are derived from the application. The cut-off used for bitumen in place was zero weight per cent. The cut-off used for plant feed is discussed under the next heading. The oil sand and overburden thickness figures

were determined from the applicants' maps and are approximate. The thickness averages are on a volumetric basis.

Properties and Bitumen Reserves
Initial, A and B Mining Areas

	Initial Area	Area A	Area B
Oil sand net thickness, ft. average, ft	80-170 123	20-130 88	60-180 120
*Overburden thickness, ft. average, ft.	5-125 46	45-140 85	30-140 87
Approximate area, acres	2270	1290	3690
Average bitumen saturation weight per cent	11.8	11.3	11.8
Average fines content in plant feed, per cent	11.4	14.5	16.9
Bitumen in place, bbl.	580,200,000	241,700,000	866,600,000
Bitumen in feed to plant, bbl.	526,200,000	210,300,000	750,000,000
Average bitumen in place per acre, bbl/acre	256,000	188,000	235,000

* The overburden thickness includes top and centre reject material in the ore body.

Oil Sands Mining and Conveying

The proposed open pit mining and materials conveying operations are shown in Figure 3, taken from the applicants' submission.

The quantities of muskeg and other organic materials are not large in the proposed mining area. This type of material would mainly be discarded on the side-walls in the mined out areas after

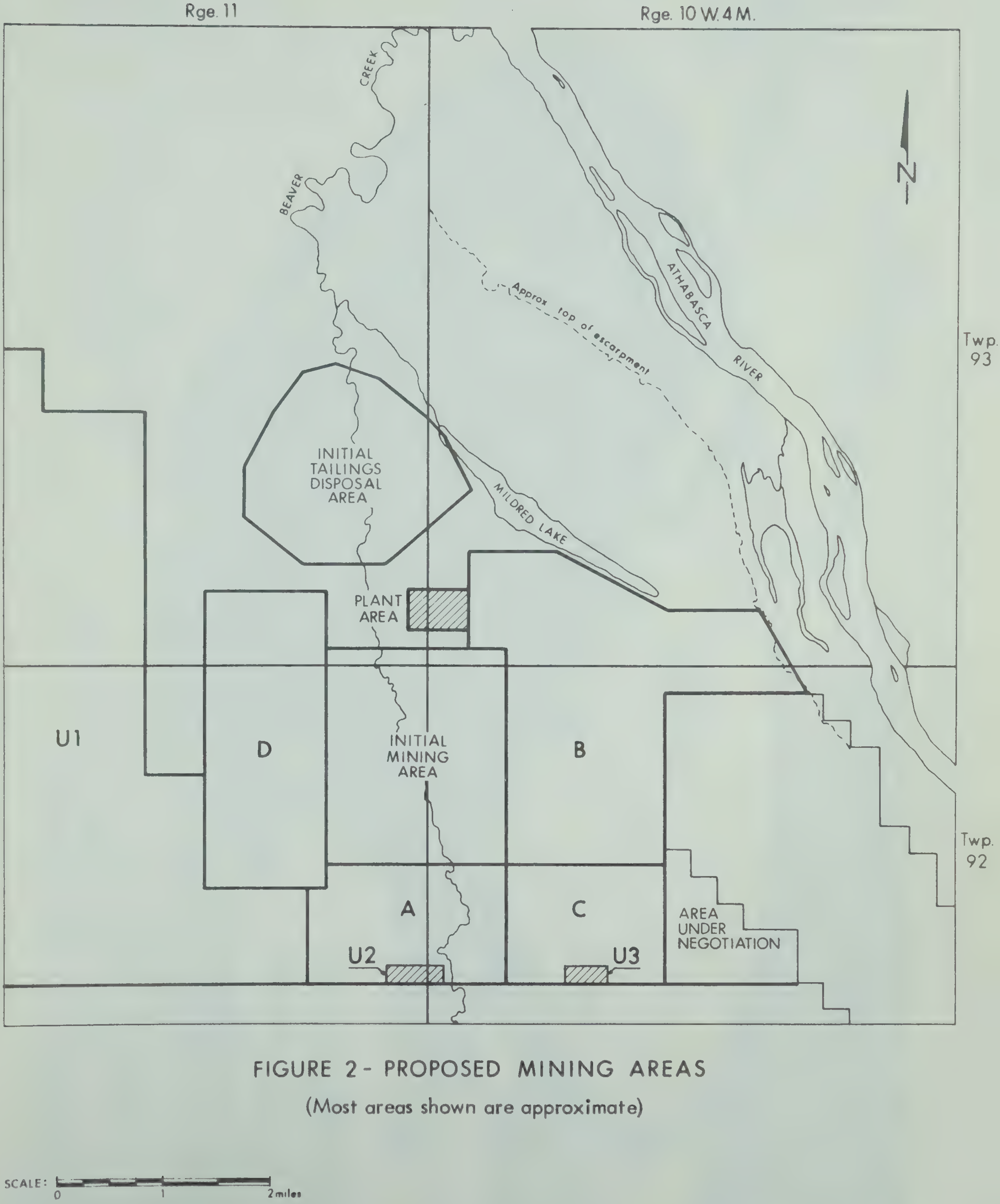


FIGURE 2 - PROPOSED MINING AREAS

(Most areas shown are approximate)

OIL AND GAS CONSERVATION BOARD
CALGARY, ALBERTA NOVEMBER, 1968

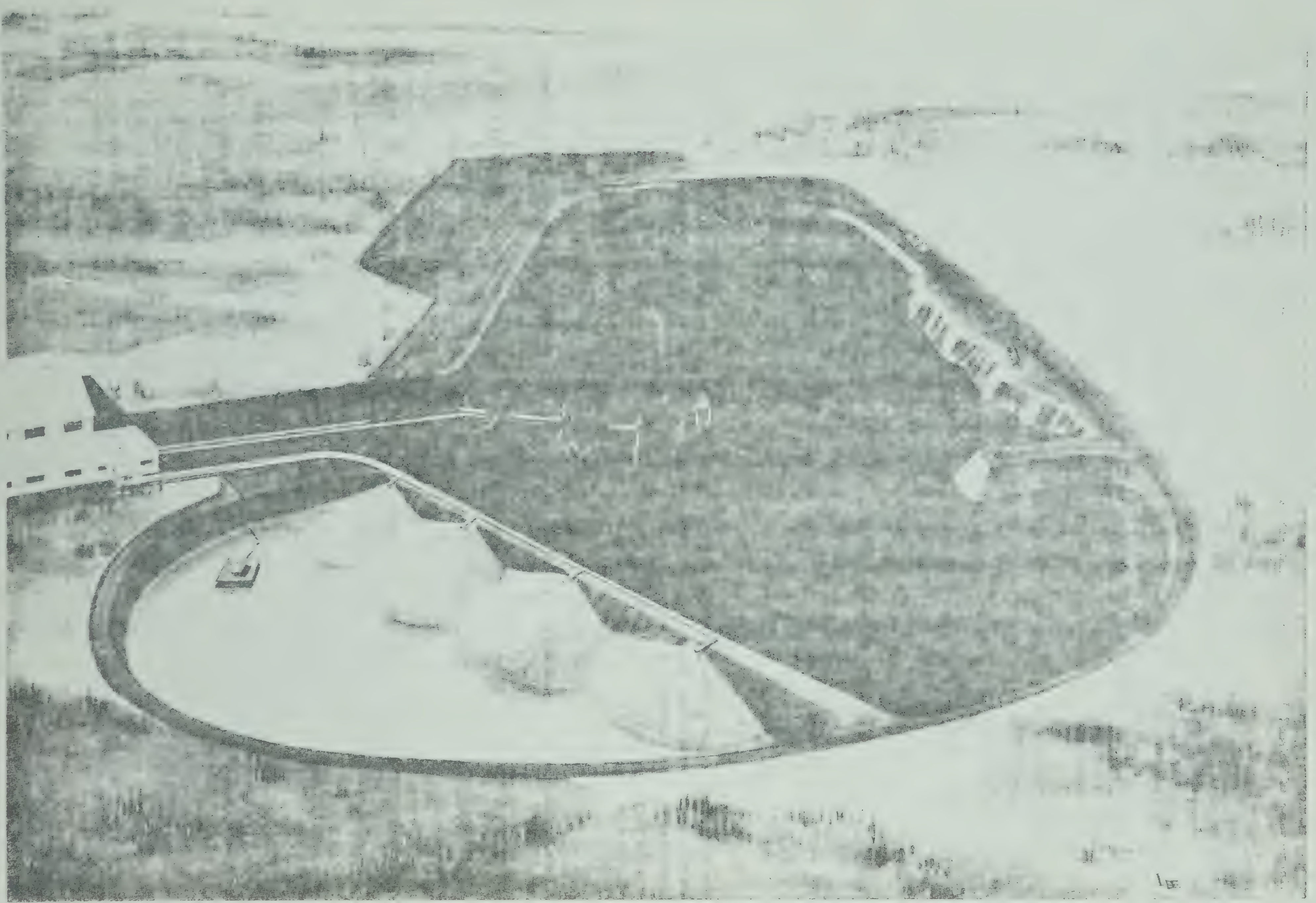


FIGURE 3 - MINING AND SOLIDS DISPOSAL
(REPRODUCED FROM THE APPLICANTS' SUBMISSION)

being removed by conventional equipment. The remaining overburden materials would be excavated by motorized scrapers and deposited in waste disposal areas or used for construction of dams, mine dikes and the like.

The oil sands would be mined by motorized scrapers operating on two benches on a sloping full-cut face. Two drive-over dumping stations would be used to transfer the oil sands to two 60-inch belt conveyors which would deliver the oil sands directly to the extraction plant. A total fleet of about 25 large scrapers would be required for the overburden removal and mining operations, with about 20 being in service at any one time. The machines would be fuelled with diesel oil from the upgrading plant.

The cut-offs proposed to be used for oil sands feed would be six weight per cent of bitumen and, in general, a minimum five-foot thickness. Sub-grade oil sands and non hydrocarbon bearing materials occurring in the ore body in beds thinner than five feet would be included in plant feed. If thicker than five feet they would be classed as "centre reject" material and handled as overburden.

The applicants propose to do some additional control drilling ahead of the mining operations in order to establish more closely the pattern of feed and reject materials to be expected. The final selection would be done visually by the machine operators under the direction of a pit supervisor.

A main criterion in the selection of open pit mine limits is the ratio of overburden plus reject material to oil sands feed.

In their submission, the applicants outlined their approach to relating limiting stripping ratio to oil sand thickness. When the stripping ratio tests were applied to the proposed 25-year mining area, the applicants found that only the small area designated U2 on Figure 2 need be excluded for the reason of excessive overburden.

Bitumen Extraction and Dehydration

The proposed extraction-dehydration system is shown schematically in Figure 4, taken from the applicants' submission. There are only minor changes from the applicants' previous process plans.

Oil sands from the mine would be fed at an average rate of about 147,000 tons per calendar day into four parallel modified dense phase extraction units. The first stage consists of slurrying the oil sands with steam and hot water in a tumbler. The slurry would be screened at the outlet of the tumbler, and particles coarser than one-quarter inch would be rejected.

The slurry would then enter the primary recovery equipment with large volumes of fresh water. The bulk of the bitumen would be removed from the surface in a froth. Sand would settle to the bottom and be removed as tailings while the middle watery stream would be transferred to secondary recovery equipment where additional bitumen would be recovered as froth and the underflow would join the tailings stream.

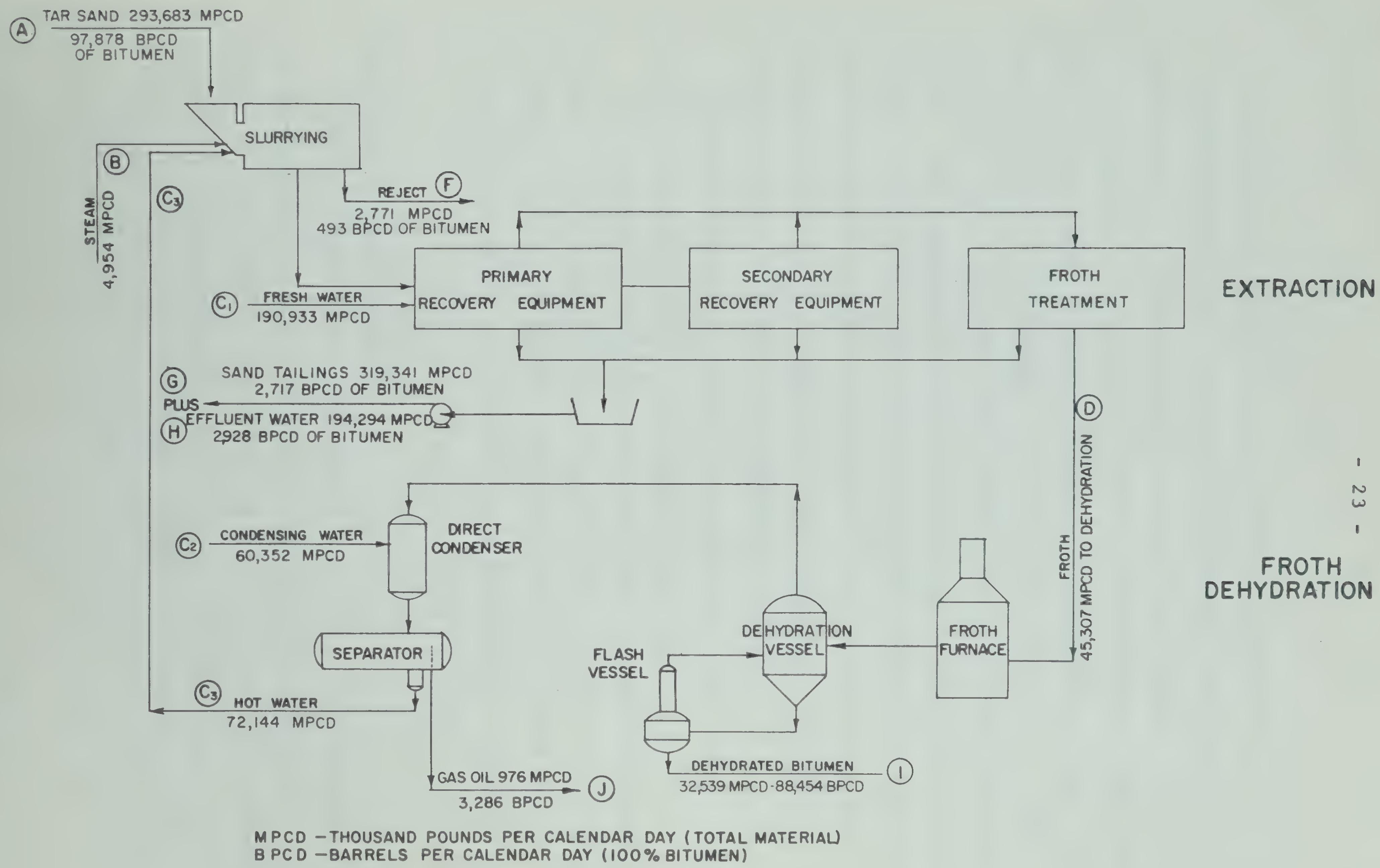


FIGURE 4 - EXTRACTION-DEHYDRATION SYSTEM SCHEMATIC FLOWSHEET

(REPRODUCED FROM THE APPLICANTS' SUBMISSION)

OIL AND GAS CONSERVATION BOARD
CALGARY, ALBERTA NOVEMBER, 1968

The combined froth from the recovery vessels would be treated for reduction of solids and water by a process not described in the application. The applicants stated at the hearing that they did not wish to reveal details of this process because they had only limited patent coverage for it. Following this step, the froth would be heated in a furnace, and then dehydrated in a vessel where the water and some light hydrocarbons would be flashed as vapour. The overhead vapours would be used to heat water used in the slurrying step. The light hydrocarbons would then be separated from the steam condensate and piped to the upgrading section. The bitumen would be flashed again for water removal prior to its being moved to the bitumen upgrading section.

The bitumen would contain approximately 3 per cent of solids (mostly fine clay) and be essentially water free.

The amount of water and steam required in the extraction process would be approximately 268,000 tons (1,530,000 barrels) per day or about 0.9 tons of water per ton of oil sand feed. The applicants submitted that the proposed ratio of water to oil sands feed is quite low for the hot water process.

Upgrading of Crude Bitumen

The proposed bitumen upgrading facilities, the hydrogen plant and the sulphur recovery facilities are shown schematically in Figure 5. The initial conversion of the oil would be performed in an H-Oil Hydrovisbreaker where high pressure hydrogen would convert the major portion of the bitumen to lighter fractions.

The products of the hydrovisbreaker on a typical day would be gas, 2320 barrels of butanes, 14,851 barrels of naphtha, 39,542 barrels of light gas oil, 24,227 barrels of heavy gas oil and 14,562 barrels of heavy bottoms or "vacuum residue". Some of the residue would actually be upgraded to provide the 350 barrels per day of diesel fuel required by the mining fleet.

The gas would be processed to remove hydrogen sulphide, and part of the gas would then be used in the steam reforming process to make hydrogen. The balance of the gas and some of the butanes would be used as plant fuel. The heavy sulphurous vacuum residue would serve as the major fuel supply for the project. It would contain most of the fine solids entering the hydrovisbreaker in the bitumen.

The other products from the hydrovisbreaker would be further hydro-treated as desired to reduce the sulphur and nitrogen contents and to saturate any remaining unstable components. The products would then be blended to make the final liquid products of naphtha, synthetic crude oil and specialty oil.

The applicants stated that two of the most attractive features of the proposed upgrading process are that it would permit considerable tailoring of the products to suit changing requirements and close matching of fuel production to requirements due to the inherent process flexibility.

The hydrogen sulphide removal unit would furnish a concentrated hydrogen sulphide stream to the sulphur plant for recovery of 472 long tons per day of elemental sulphur by conventional

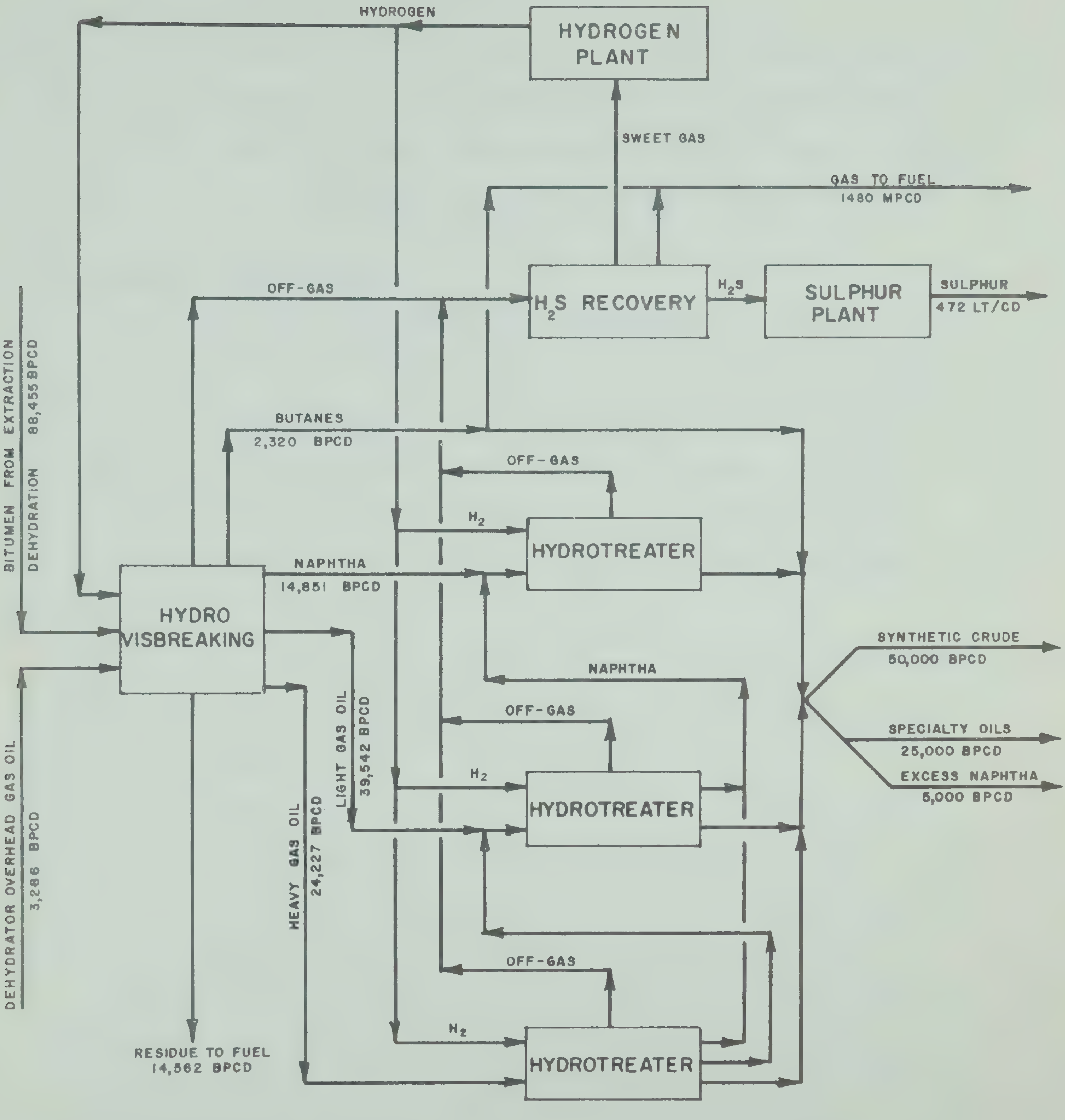


FIGURE 5 - BITUMEN UPGRADING SYSTEM SCHEMATIC FLOWSHEET
(REPRODUCED FROM THE APPLICANTS' SUBMISSION)

OIL AND GAS CONSERVATION BOARD
CALGARY, ALBERTA NOVEMBER, 1968

means using a modified Claus reaction process. If one of several available processes proved to be applicable, additional quantities of sulphur of up to 48 long tons per day could be recovered from the water used in visbreaker overhead and hydrotreater lines.

Recovery and Conservation

The applicants predicted that the overall hydrocarbons recovery efficiency would be 70 to 74 volume per cent, depending upon the location of the oil sands being mined. The estimated volume per cent recoveries for the various process steps were 86.6 to 90.7 for mining, 93.7 for extraction-dehydration, and 87.2 for upgrading. On a weight basis, the predicted upgrading recovery was 73.5 per cent.

The comparable volume per cent recoveries predicted in the 1963 application were 83 for mining, 85 for extraction-dehydration, and 73 for upgrading.

An estimated 66.2 per cent of the sulphur entering the upgrading process in the bitumen and dehydrator overhead oil would be recovered as elemental sulphur. This is an increase of 11 per cent over the recovery predicted in the 1963 application.

Recovery and conservation are discussed more fully in Section VII.

Disposal of Wastes

The locations of the major disposal facilities for sand tailings and waste water are shown on Figure 1.

(1) Sand Tailings and Sludge

The tailings and effluent water streams from the extraction process would be combined and disposed of hydraulically. During the first five or so years of operation, the tailings stream would be deposited from trestles behind a retaining dam to be built on the south side of the initial tailings disposal area. Water would drain northwards from the tailings pile to the retention pond formed by a dam. The water would carry that part of the bitumen and clay sludge which was not retained in the pores of the sand tailings pile. The sludge would settle in the retention pond. The entrained bitumen would also settle to the bottom, except for a frothy portion which would be skimmed from the pond surface.

The maximum height of the sand tailings pile would be about 175 feet above the original bed of the diverted Beaver Creek.

In future years, the tailings and effluent water stream would be directed to diked cells in the mined out area and the drainings would be pumped to the retention pond.

The combined tailings stream from the extraction plant would contain approximately 121,000 tons per day of solids, 135,000 tons per day of water and 2,000 tons per day of bitumen.

The ultimate restoration of all tailings and sludge areas would involve a grassing or other vegetation cover program. In the case of sludges, it would take a considerably longer time for sufficient compaction and drainage to occur to permit growth.

(2) Waste Water

The main waste water streams have been described above to the point where the water becomes clarified by settling and froth skimming. Contaminated waters from bitumen upgrading would also be treated and pumped to the retention pond.

The clarified water from the pond would be almost entirely recycled to the extraction plant when the pond became full. The applicants stated that if it proved necessary to decant water to the Athabasca River, they would be obliged to observe the requirements of the Alberta Department of Health.

The remainder of the project water system would not receive any plant contaminants such as solids or oily wastes. This part of the system would supply water to the plants and would receive in return only clean water such as plant cooling water.

The Alberta Department of Health has advised the applicants that the proposed general approach to water pollution control is considered suitable. The applicants would be required to obtain the Department's approval of detailed pollution control plans before proceeding with the project.

(3) Wastes Entering the Atmosphere

The major air pollutant from the project would be sulphur dioxide gas contained in the stack gases. The average emission rate would be 475 tons per day of sulphur dioxide or 211 long tons per day of sulphur. As in the case of water pollution control, discussions have been held with the Department of Health regarding air pollution control. The Department advised

the applicants that the control of sulphur dioxide and also of particulate matter must be considered by it in detail.

Auxiliary Facilities

Mildred Lake would be used as a fresh water reservoir for the project water supply. The diverted Beaver Creek would be the main water source, and the Athabasca River would supply any deficiencies and receive any overflow.

The applicants have held preliminary discussions with utility companies interested in supplying electrical power, steam and treated water and they would anticipate using existing pipe line facilities to market the hydrocarbon products. They would be willing, however, to construct both the power-steam plant and the pipe line if suitable contractual arrangements cannot be made.

The total capacity of hydrocarbon tankage to be installed would be in the order of 4,000,000 barrels.

The use of natural gas is not anticipated by the applicants, but if gas became available it would facilitate plant start-ups and would permit an increase in the yield of liquid hydrocarbon products if gas were used as fuel in place of some of the residual oil.

Description and Value of Products

The specifications of the plant hydrocarbon products streams are not firmly fixed. It would be the applicants' intention to be able to blend components to provide several

qualities of synthetic crude and specialty oils.

The following typical specifications of the products were provided in the application and in the applicants' evidence at the hearing:

(1) Synthetic Crude Oil

Gravity	34.0° API
Sulphur	0.3 weight per cent
Nitrogen	0.07 weight per cent
Solids	nil
Liquid Fractions, volume per cent	
Butanes	1.3
C_5 - 380°F	23.7
380° - 650°F	50.5
650°F plus	24.5

(2) Specialty Oil

In this case, the viscosity and sulphur content are each expressed as an expected range.

Solids	nil
Average Liquid Fractions, approximate volume per cent	
380° - 650°F	30
650°F plus	70
Viscosity at 100°F, S.U.S. (Saybolt universal seconds)	45 to 175
Sulphur, weight per cent	0.3 to 2.0

(3) Naphtha

Gravity, degrees API	50 - 60
Sulphur, weight per cent	0.01
Boiling Range	C4/320° - 400°F

As discussed previously, elemental sulphur would be produced in addition to the above products. The crude bitumen contains small, but significant, quantities of vanadium, and the applicants stated that there was a good possibility that this metal would be produced, presumably from fuel oil ash.

As the Board understands the application, electrical power generated with plant fuel will not be distributed beyond the project boundaries.

The estimated values of the hydrocarbon products on a per barrel basis at Edmonton were estimated by the applicants to be $3.00 for naphtha, $2.75 plus for synthetic crude oil and $2.00 plus for the specialty oils. The sulphur is expected to sell at the plant site at $25.00 per long ton on a long term basis.

Market Potential

The applicants prepared estimates of supply and demand for oil in Canada and the United States.

(1) United States Supply and Demand

Declining exploration activity and the likelihood of higher costs indicated to the applicants that the United States would encounter difficulties in exceeding historical reserve finding rates. The applicants' study assumed that the United States

life index, which had declined each year since 1958, would continue to fall. Supply-demand relationships were developed for the period 1967 to 1985. Based on an extrapolation of historical growth rates, and the application of judgment to future trends, United States demand for liquid hydrocarbons was anticipated to increase steadily from 12,583 thousand barrels per day in 1967 to 18,832 thousand barrels per day in 1985. The supply forecast included a state by state examination of drilling activity and reserve appreciation and assumed that for policy reasons the United States life index would not fall below nine years. Domestic supply of conventional liquid hydrocarbons was expected to rise from 10,222 thousand barrels per day in 1967 to 11,637 thousand barrels per day in 1980, falling marginally to 11,605 thousand barrels per day in 1985.

The resulting supply-demand deficiency rose from 2,361 thousand barrels per day in 1967 to 7,227 thousand barrels per day in 1985. At the hearing, Mr. Daniel, a witness for the applicants, indicated that the impact of the Prudhoe Bay discovery in Alaska had been allowed for in the supply forecast and that even if this allowance were insufficient, the possibility that the demand forecast would be low may provide a compensatory adjustment in terms of the deficiency calculation. The manner in which the deficiency would be supplied was assessed by projecting the historical growth of overland imports and the potential availability of United States synthetic production. The difference between the deficiency and the anticipated level of overland imports and synthetic production

was attributed to overseas imports. On this basis the proportion of United States demand for liquid hydrocarbons satisfied by overseas sources of supply was expected to rise from 15.5 per cent in 1967 to 26.6 per cent by 1985. The applicants expressed the belief that the United States would be reluctant to allow such a degree of dependence on overseas sources of supply and that consequently the attraction of Canada as a secure supply source would be enhanced. Under these circumstances, current restraints on the importation of Canadian oil into the United States would be relaxed by the mid-1970's, which would permit Canadian conventional oil to penetrate to its economic limit by this time.

(2) Canadian Supply and Demand

Estimates of exports of Canadian oil defined as crude oil and equivalent to the United States were prepared for each relevant PAD District based on an overall supply-demand balance for each such area. Total exports were anticipated to rise from 412 thousand barrels per day in 1967 to 1,226 thousand barrels per day in 1985. Estimates of domestic demand for Canadian oil were derived from an energy requirement forecast which was related to anticipated economic growth. The distribution of the total energy projection among energy sources was a function of availability, convenience and price. Canadian demand for Canadian oil was expected to increase from 632 thousand barrels per day in 1967 to 1,120 thousand barrels per day in 1985. Thus the applicant forecast that the total demand for Canadian crude oil would rise from 1,044 thousand barrels per day in 1967 to 2,346 thousand barrels per day in 1985.

The projection of Canadian supply assumed a gradual decline in production from Saskatchewan, increased production from British Columbia until the mid-1970's with little variation thereafter and constant production levels from Manitoba, Ontario and other areas. It was anticipated that production from new areas, such as the Northwest Territories, would be available in the early 1970's and would rise to 390,000 barrels per day in 1985. Overall, production from areas in Canada west of the Ottawa Valley, other than Alberta, was forecast to rise from 332 thousand barrels per day in 1967 to 585 thousand barrels per day in 1985. Subtracting such amounts from the total demand for Canadian oil yielded requirements for Alberta oil of 712 thousand barrels per day in 1967, increasing to 1,761 thousand barrels per day in 1985.

Further details of the applicants' evidence concerning United States supply and demand, the operation of the United States Oil Import Program and Canadian supply and demand are given in Sections X, XI and VIII respectively.

(3) Heavy Fuel Oil Markets Within Canada

The applicants included figures showing the demand for, and domestic production of, heavy fuel oil - defined principally as Number 6 fuel oil - in Ontario and British Columbia. Maximum and minimum cases were presented for demand, which reflected a variation in the proportion of the market supplied by natural gas. For Ontario, maximum and minimum cases were also projected for production. However, the variation was small, and under both cases production was expected to show little growth, the main

reason for which was an anticipated reduction in the availability of Saskatchewan medium gravity oils. Production of heavy fuel oil in British Columbia was estimated to increase gradually. The heavy fuel oil deficiency in Ontario to be supplied by imports and transfers from Provinces east of Ontario was anticipated to increase from some 24,000 barrels per day in 1967 to 70,000 barrels per day and 54,000 barrels per day respectively for the maximum and minimum cases in 1980. Corresponding figures for British Columbia were 16,000 barrels per day in 1967 rising to 22,000 barrels per day and 18,000 barrels per day respectively in 1980.

Further details of the applicants' projection are given in Section IX.

Disposition of Products

The participatory share of Atlantic Richfield, Cities Service and Imperial each in the disposition of products from the proposed plant amounted to 30 per cent. Under the anticipated plant output configuration of 50,000 barrels per day of synthetic crude oil, 25,000 barrels per day of specialty oil and 5,000 barrels per day of naphtha, each such share amounts to 15,000 barrels per day, 7,500 barrels per day and 1,500 barrels per day of the respective products. The responsibility for disposition of the remaining 10 per cent share of the plant output, amounting to 5,000 barrels per day of synthetic crude oil, 2,500 barrels per day of specialty oil and 500 barrels per day of naphtha, was Royalite's. The manner in which each participant intended to dispose of its share of production is summarized below. Each company used the designation 'new within reach'

markets and 'beyond reach' markets in the sense invested in these terms by the Alberta Government's 1968 Oil Sands Policy Statement.

(1) Atlantic Richfield Company

Atlantic Richfield proposed to market its share of the synthetic crude oil in 'new within reach' markets. The company did not envisage purchasing Alberta oil in the foreseeable future, either for direct use or by exchange, except under the terms of a permit relating to the application. During testimony, Mr. Smirlock, the witness for Atlantic Richfield, indicated the most likely arrangement would be for Atlantic Richfield to initiate an exchange agreement with a refinery in the Chicago area, but that no such agreement could be concluded five years in advance of the time at which the supply will be available. The disposition of the specialty products was designated for 'beyond reach' markets, possibly in Canada, but more likely in the Great Lakes area of the United States, in a manner similar to the arrangements proposed by Cities Service. The naphtha was also designated for 'beyond reach' markets.

(2) Cities Service Athabasca, Inc.

Cities Service proposed to dispose of its share of synthetic crude oil in 'new' markets within reach. At the hearing, Mr. Hamilton, Cities Service's witness, stated that in all probability the refinery concerned would be Cities Service's plant at East Chicago, which in the absence of the incentives under the Oil Sands Development Policy would not find Canadian oil

an attractive feedstock. Similarly to Atlantic Richfield, Cities Service indicated that the conclusion of firm arrangements so far in advance was not feasible. Cities Service anticipated marketing its share of the specialty oils and naphtha in 'beyond reach' markets. The market designated for the specialty oil was the heavy fuel oil market in the Great Lakes area.

(3) Imperial Oil Limited

Imperial said it intended to dispose of its share of synthetic crude oil by agreement with its affiliate, Humble Oil and Refining Company. This company currently did not purchase Canadian oil in the United States Midwest. Humble Oil and Refining Company proposed to market the synthetic crude oil by exchange or processing agreement with a Chicago area refinery or possibly at a refinery which it may construct in the Chicago area. At the hearing, Mr. Yeager, the witness from Humble Oil and Refining Company, indicated that the designated markets would most likely be of the 'new within reach' character, but that some possibility did exist for disposal in 'beyond reach' markets. Mr. Yeager averred that it was not practicable for Humble Oil and Refining Company to enter into more definitive arrangements at this time. Imperial stated that it would market the specialty oils in 'beyond reach' markets and in particular by displacing imports and transfers in the Ontario fuel oil market. The naphtha also was destined for beyond reach markets. Mr. Maier, the witness for Imperial, indicated that overseas markets for this product might be developed.

(4) Royalite

Royalite arranged through The British American Oil Company Limited to sell its share of the synthetic crude oil to Gulf Oil Company for processing at its Toledo refinery, which Royalite proposed to treat as a 'new within reach' market. Mr. Hoskins, the witness from Gulf Oil Corporation, testified that the processing of the amounts of conventional and synthetic crude oil contingent upon approval of the application would be over and above any volumes of Canadian oil which may be processed at the Toledo refinery at the time when the synthetic crude oil becomes available. Royalite proposed that the specialty products and naphtha would be marketed by The British American Oil Company Limited in 'beyond reach' markets. The specialty oil was designated for the heavy fuel oil market in Ontario and possibly British Columbia, where it would displace imports or transfers from Eastern Canada.

Each applicant stated at the hearing that if 'beyond reach' markets for naphtha were not available, this product would be blended with the synthetic crude oil, while a like volume of the heavier component of the synthetic crude oil would be diverted to the specialty oil stream. Hence, under these circumstances, the volume of synthetic crude oil for disposal would remain at 50,000 barrels per day, while the volume of specialty oil would increase to 30,000 barrels per day. The applicants' intention of marketing the specialty oil in 'beyond reach' markets remained unaltered.

Further details concerning the applicants' proposals for the disposition of the plant product are included in Section XII.

Cost Estimates and Scale of Operations

(1) Cash Requirements

The tabulation which follows shows the initial cash requirements in dollars as estimated by the applicants. Anticipated price escalation is included in the figures. The mining and materials handling item includes the cost of waste disposal facilities. The term "offsites" is a general term intended to include facilities and equipment needed to run the plant and includes tankage, administrative, shop, warehouse, safety, pumping, electrical distribution and communications facilities, site preparation, piping and mobile equipment.

Construction Costs		
Mining and Materials Handling	$19,500,000	
Extraction and Dehydration	28,100,000	
Bitumen Upgrading	73,600,000	
Offsites	32,500,000	
Total Construction Costs		$153,700,000
Pre-production and Start-up Costs		18,300,000
Townsite Subsidy		3,000,000
Working Capital		7,200,000
Interest During Construction		10,300,000
Total Cash Requirements		$192,500,000

Not included in the above are research and development expenses already incurred and the cost of future pilot operations. The average annual capital addition after start-up, as estimated by the applicants, would be $3,000,000.

(2) Operating Costs

The annual operating costs including utilities were estimated by the applicants at $26,300,000. This figure does not include depreciation, interest, income tax, pipe line tariffs or Crown royalty. Approximately one-half of the operating costs would be for mining.

(3) Scale of Operations

The applicants contended that the optimum economic production capacity of a plant such as the one proposed would exceed 100,000 barrels per day of synthetic crude oil. They stated that the production rates they have applied for, that is a total of 80,000 barrels per day of all hydrocarbon products, is the minimum configuration which would satisfy their various investment criteria.

Financing

Each of the participants would provide and make arrangements for financing its share of the project, including the construction and operation of the plant and all attendant facilities, by the most suitable means for its own purposes and participation.

Development Program and Commitment to Proceed

Preliminary engineering for the project has been underway for several years, and would be accelerated if and when the project were approved. The applicants submitted a development schedule for the years following an approval, and it is outlined below:

Year	Operation
1	Final piloting of the extraction and upgrading processes to obtain data for commercial design to begin and be completed. Process optimization work to be completed and some specification work begun.
2	Specification work to be completed, bids to be received and all major contracts to be let. Site preparation work to be conducted.
3	Site preparation to be completed. Major plant construction to begin.
4	Plant construction to continue and pre-stripping of overburden to be carried out.
5	Construction to be completed. Start-up of the project to occur over a five-month period. The total plant should be on stream 4½ years after the commencement of the program.

The applicants predicted that the plant would go on stream in 1973 and reach sustained production in 1974 if the application should be approved.

The applicants stated in their submission that they would proceed with engineering and construction upon approval of the application "subject only to evaluation as required of regulatory, fiscal and economic factors which would seriously jeopardize the success of the project". The type of factor which might cause a decision not to proceed was described by Mr. Spragins of Syncrude as a "major unforeseen event".

III SUBMISSIONS OF INTERVENERS

Banff Oil Ltd. and Aquitaine Company of Canada Ltd.

Banff and Aquitaine, in a joint intervention, objected to the applicants' interpretation of the Oil Sands Development Policy and contended that the application was "not in accord with the letter and spirit" of the policy, and should be denied.

With respect to the "new within reach markets" for synthetic crude oil, Banff and Aquitaine disagreed with the applicants' claim that the latter's proposed markets in areas or refineries now or soon to be served by Canadian conventional crude oil could be considered as "new" markets.

With regard to the specialty products, these interveners stated that the composition of these products basically would be the same as synthetic crude oil and it would be unreasonable to accord them preferential treatment as regards to marketing. Banff and Aquitaine claimed that the specialty oil proposed by the applicants was not unique and could be made on a competitive basis in appropriate facilities from conventional crude oil, but in answer to a question, Mr. Last of Banff said that it was not Banff's contention that the specialty oils proposed to be produced by the applicants could be produced economically from Alberta conventional crude oil under the proration plan.

Banff and Aquitaine expressed the belief that if the applicants' marketing philosophies were adopted, oil sands production would increase greatly above the 150,000 barrels per day limit to the advantage of refining oriented companies and the detriment of others

in the conventional oil industry. Control of the Alberta proration plan would shift, they said, to the refining companies.

The recommendation of Banff and Aquitaine was that the full 80,000 barrels per day output of the proposed plant be considered within the 150,000 barrels per day policy limit, and that the limit be strictly maintained.

Canadian Fina Oil Limited

Canadian Fina expressed the belief that the scale of the proposed project should be established at the minimum economic level in fairness to the conventional crude oil industry and other oil sand owners, and to meet the Government's objective of stimulating and leaving room for additional technological development. It argued that upon the evidence the applicants should be able to proceed with a smaller plant.

In the opinion of Canadian Fina, the application provided little support for their position that "new within reach" markets would satisfy the Oil Sands Development Policy. Canadian Fina said that it was for the Board to decide if the evidence at the hearing had supplied this deficiency.

Subject to the above qualifications, Canadian Fina supported the granting of the Syncrude application.

Mr. Harvie, the Canadian Fina witness, said that if the proposed $200 million investment should be made and employment generated for a thousand employees, and then the applicants should fail to satisfy the Board that they were complying with the Oil Sands Development Policy, political pressures in the Province could

prevent a shut down or partial shut down of the project.

Chevron Standard Limited

In addition to its submission, at the hearing Chevron extended its evidence to embrace details on the United States market for Canadian oil and the United States supply-demand balance.

(1) United States Supply and Demand

On the basis of an anticipated average annual growth rate of 2.75 per cent, Chevron estimated that the United States consumption of liquid hydrocarbons would rise from 12,758 thousand barrels per day in 1967 to 18,060 thousand barrels per day in 1980. Production of liquid hydrocarbons was anticipated to rise from 10,222 thousand barrels per day in 1967 to 12,795 thousand barrels per day in 1980. The latter figure included 100 thousand barrels per day of synthetic oil. The supply forecast was based on normal reserve additions, predicated on historical rates experienced for the last 10 to 15 years, but did not allow for substantial new developments, such as are indicated for Prudhoe Bay. On the basis of these figures, Chevron projected a United States deficit for liquid hydrocarbons rising from 2,536 thousand barrels per day in 1967 to 5,265 thousand barrels per day in 1980.

(2) Canadian Exports to the United States

With respect to District V, Chevron anticipated that Canadian exports would fall to 120 thousand barrels per day in 1970 and subsequently increase to 225 thousand barrels per day by 1980. Chevron qualified this forecast insofar as no allowance had been made for additional domestic production resulting from the Prudhoe

Bay discovery or from potential offshore discoveries in California. Chevron said these developments could 'supress' any growth in Canadian exports to District V. In Districts I to IV, Chevron anticipated that exports of Canadian crude oil and products could rise from 254 thousand barrels per day in 1967 to 830 thousand barrels per day in 1980. In testimony, Chevron alluded to several nascent or proposed pipe lines related to areas served by Canadian oil, which it contended would ensure continued competition for Canadian oil from United States domestic sources of supply. These developments and other considerations indicated to Chevron that controls on the export of Canadian oil to the United States would not be relaxed by the mid-1970's.

(3) The Application and the Oil Sands Development Policy

In its submission, Chevron contended that the marketing of synthetic crude oil must of necessity displace Canadian conventional oil, under the terms of the current United States Oil Import Program. Chevron interpreted a "new within reach" market as referring to a general area rather than a specific refinery. It contended that, if in fact "new" market was intended to refer to specific refineries, the applicants' evidence as to the disposition of products, with the exception of Royalite's, was sufficiently indefinite as not to warrant serious consideration. The Royalite proposal to utilize the Gulf Oil Corporation refinery at Toledo would not qualify as a "new within reach" market, since it constituted, in Chevron's opinion, a normal growth market for Canadian oil. With respect to the marketing of specialty oils in "beyond reach" markets, Chevron submitted that the fuel oil markets proposed by the applicants

were ones which the conventional industry could serve equally well as compared to synthetic oil in terms of price and quality. On the basis of the applicants' testimony, Chevron concluded that the applicants classed as specialty oils a product distinguishable from synthetic crude oil only by its market.

With respect to the satisfaction of the life index test under the Government's Oil Sands Policy, on the basis of a reserve growth rate of 450 million barrels per year and the applicants' demand figures, Chevron computed an Alberta life index of 22 years for 1973, the date at which the proposed plant was scheduled to commence production. In view of the Government's adoption of a 12 to 13 year minimum life index, Chevron suggested that the application be deferred until it appeared likely that the reserve life index would approach this level within 5 years.

Chevron contended that the incentive for growth under the proration system depends on the equal opportunity of each producer to participate in the total market. If a fixed portion of the market should be allocated to the applicants the concept of equal opportunity would be weakened. Chevron said that this feature was contrary to the intent of the Government Oil Sands Policy.

Chevron further contended that approval of the application, by destroying in part the ground rules on which existing investments in the conventional industry had been made, would adversely affect the investment climate. Chevron considered that the applicants' project would have less overall impact on the provincial economy than that resulting from any reversal in the growth of the conventional industry. Moreover, it would reduce the revenues that

would have been available to the Provincial Government. As such, approval of the project was not in the public interest.

Chevron voiced the view that oil sands technology was sufficiently in advance of oil from coal or oil from shale programs in the United States that apprehensions of competition from these sources were unfounded.

Chevron concluded that the applicants have not made their case in any respect, and the application ought to be denied.

Dome Petroleum Limited

Dome requested deferment of the application because, in its opinion, the granting of the application would not be in the public interest and would be detrimental to the conventional crude oil industry. The reasons presented by Dome in its submission were:

(1) The future market for Alberta conventional crude oil will be subject to pressures from a new producing region in Alaska and from products from offshore oil which will penetrate the Ontario market.

(2) Any synthetic crude oil exported to the United States will displace conventional oil from that market under the United States oil import program.

(3) Prorated Alberta crude oils have been receiving a decreasing share of the available market, are producing at less than half capacity and will continue to have a high life index. In contrast, the Syncrude plant would produce at full capacity at a much lower production unit investment cost.

(4) Syncrude's proposed mining and processing methods may not be much different from those now in use.

(5) Time should be allowed to assess the effects of the above factors on the market for conventional crude oil, rather than approving further production of unprorated synthetic crude oil at a time when the outlook for improved crude oil markets is in doubt.

Town of Fort Smith

Fort Smith said it is in favour of the Syncrude project, as it would contribute to the growth and development of north-eastern Alberta and the Northwest Territories. This would contribute to the development of gypsum deposits at Peace Point and other mineral resources of the north.

Great Canadian Oil Sands Limited

Great Canadian supported the Syncrude application on the basis that construction of the project would afford opportunities for co-operation between the two oil sands development companies in areas of mutual interest. These areas of interest were defined at the hearing by the Great Canadian witness, Mr. Burk, as the fostering of community development, assistance in emergencies, joint use of oil and gas pipe lines, development of roads and communication networks serving the area, attracting suppliers to the area and hastening the availability of a connection to the Alberta electrical power grid.

Great Canadian stated that it had placed before the Board an

application to increase the production limit of its own plant by about 20,000 barrels per day to 23,725,000 barrels per year of synthetic crude oil.

Great Plains Development Company of Canada, Ltd.

Great Plains expressed the belief that a portion of the oil sands production that may be permitted under the Oil Sands Development Policy should be reserved for production from the Cold Lake oil sands in order to encourage research into in situ methods of exploiting these deposits. Great Plains and others are currently engaged in such research. It said it is possible that Cold Lake deposits could be economically produced before completion of the applicants' proposed plant.

In the opinion of Great Plains, the Syncrude marketing plans did not appear to comply with the Alberta Oil Sands Development Policy. It submitted that the applicants have not adduced sufficient evidence to ensure that the synthetic crude oil will be marketed in "new" markets or in "beyond reach markets" in accordance with the policy.

Great Plains contended that oil sands oils exported to the United States would directly or indirectly displace conventional Canadian crude from that market. It interpreted the applicants' presentation as depending on the absence of restrictions on importation of Canadian crude oil into the United States in the mid-1970's. Great Plains argued that, upon an analysis of the testimony at the hearing, the applicants' witness regarding supply and demand in the United States and the probable future

course of the United States Oil Import Program, upon the weight of evidence, must be taken to be wrong.

Great Plains concluded that approval of the application should be deferred until the applicants can show that their marketing will comply with the Oil Sands Development Policy.

Hudson's Bay Oil and Gas Company Limited

In Hudson's Bay's argument it submitted that the dominant issue was whether or not the applicants had satisfied the Board that approval of the proposed project at this time would not prejudice the conventional crude oil industry beyond what is reasonable. Otherwise, a further look should be taken at the project two or three years hence when "further and better information can be reasonably expected".

Hudson's Bay argued that the Board, before granting the application, should be satisfied with the applicants' propositions that offshore imports into the United States will be kept at 16 per cent of the domestic production for the foreseeable future and that the present informal quotas restricting volumes of Canadian crude oil imported into the United States will be entirely removed by the time Syncrude's proposed plant is on stream. While Hudson's Bay said this was a matter for the Board to decide, it indicated that it was impressed by the Mobil and Chevron witnesses who disagreed with the Syncrude propositions.

Independent Petroleum Association of Canada

IPAC submitted that the application does not meet the requirements of the Oil Sands Development Policy, particularly with

respect to "new" markets. It argued that before a market can be accepted as a new market it must be shown to be

(a) one that is not being served today,

(b) one over and above the normal growth in existing markets, and

(c) one representing a net growth in total market.

IPAC took issue with the applicants' testimony regarding the probable course of the United States Oil Import Program. Its witness, W. C. Rich, Jr., said there were "constant and ever-increasing pressures" from a large number of sources for the regulation of the access of Canadian oil to markets in the United States, and for statutory provision for such regulation. He listed and discussed many such sources of pressure.

In advancing its argument regarding the United States Oil Import Program, IPAC challenged the applicants' supply and market studies, and with reference particularly to American supplies indicated they are subject to uncertainties because of Alaskan discoveries and offshore reserves.

This intervener, in discussing the Chicago and Toledo area markets, submitted that these areas are, or with completion of pipe line facilities now under construction soon would be, served with Canadian conventional crude oil, and subject to purchaser preferences in some cases, the Canadian conventional crude oil would have a good competitive position. The applicants' claims for a "new" classification for within reach markets cannot be assessed satisfactorily because each involved a subjective opinion

to which an independent objective analysis cannot be applied, and because it would depend on political and international reasons as well as company commitments. It also submitted that geographical location rather than individual company decisions should determine the classification of the market.

In light of the above, IPAC submitted that the applicants' proposed production would displace and supplant Canadian conventional crude from its foreseeable markets.

With regard to the specialty oil referred to in the application, IPAC argued that it would be in reality desirable refinery feedstock.

In its argument, IPAC commented on the questions regarding surveillance of marketing that had been asked during the hearing. It said provisions for surveillance cannot be a substitute for the application satisfying the requirements of the Oil Sands Development Policy, which IPAC submits it failed to do.

<u>Mobil Oil of Canada, Ltd.</u>

Mobil submitted that the application did not conform to the requirements of the Oil Sands Development Policy. With respect to the applicants' proposals for the marketing of volumes of synthetic crude oil and any associated conventional oil in "new within reach" markets, Mobil contended that the operation of the United States Oil Import Program would preclude the applicant achieving a net growth in the total market, since Canadian conventional oil would be displaced. The "new" markets designated

by the applicant would only result in increased Canadian production if imports were unrestricted. Mobil said it did not believe that the United States Oil Import Program would accommodate such a revision by the time production from the proposed plant would be available. As a result, it expressed concern that approval of the application would secure preferential treatment for the applicants as importers of Alberta oil.

Mobil submitted that the objective of maintaining the technological position of the oil sands as a source of synthetic crude oil would best be satisfied by the development of a variety of exploitation processes, and that "sufficient incentive, in terms of oil sands allowable, should be available" to encourage alternative techniques. Approval of the proposed project could exclude other projects which may be able to commence production within the next five years.

Pan American Petroleum Corporation

Pan American did not present a submission at the hearing, but did summarize its views in written argument. Pan American neither supported nor opposed the application, but did request that some incentive be retained under the terms of the Alberta Oil Sands Development Policy to encourage expanded development of in situ bitumen recovery schemes.

The company noted that in situ methods, such as it and others are developing at great expense, will ultimately be responsible for the major part of the recovery from Alberta's oil sands.

IV STATUTORY PROVISIONS AND THE GOVERNMENT'S OIL SANDS DEVELOPMENT POLICY

This section outlines the provisions of The Oil and Gas Conservation Act under which the subject application was made and the Alberta Government's Oil Sands Development Policy in the light of which it must be considered.

Part VIA of the Act, dealing with oil sands, was first enacted in 1960 and has remained substantially unchanged since 1961.

The Policy was enunciated in October, 1962, and a statement modifying it was made in February, 1968. This section recapitulates some of the principal requirements of the original policy and the modifications of this year. To show how the Policy has been interpreted by the Board, passages from earlier Board reports are reiterated. The recommendations reached in each of these earlier reports dealing with schemes for commercial production from oil sands were accepted by the Lieutenant Governor in Council.

Statutory Provisions

At the 1968 session of the Legislative Assembly of Alberta, the provisions of The Oil and Gas Conservation Act relating to oil sands were amended in the light of the new policy statement. To this end new definitions were placedin the Act, and Part VIA was reworded employing the newly defined terms. The substance of Part VIA as it applies to the present application was unchanged. The amending act also contained some incidental amendments concerning

oil sands, such as those to the taxation and reporting provisions, that relate neither to the policy nor to applications like that now under consideration.

The new definitions are as follows:

"crude bitumen" means a naturally occurring viscous mixture, mainly of hydrocarbons heavier than pentane, that may contain sulphur compounds, and that in its naturally occurring viscous state is not recoverable at a commercial rate through a well;

"oil sands" means sands and other rock materials which contain crude bitumen and includes all other mineral substances in association therewith;

"synthetic crude oil" means a mixture, mainly of pentanes and heavier hydrocarbons, that may contain sulphur compounds, that is derived from crude bitumen and that is liquid at the conditions under which its volume is measured or estimated, and includes all other hydrocarbon mixtures so derived.

Following the 1968 amendments, Part VIA of the Act reads as follows:

PART VIA

OIL SANDS

49a. (1) No scheme or operation for the recovery of oil sands, crude bitumen or products derived therefrom shall be proceeded with unless the Board, upon application and by order, has approved it.

(2) Upon receipt of an application pursuant to subsection (1), together with any information prescribed or required by the Board, the Board shall hold a hearing of the application and may, if so authorized by the Lieutenant Governor in Council, approve the scheme or operation proposed in the application.

(3) Notwithstanding subsection (2), where the scheme or operation is for experimental purposes and involves no commercial production of oil sands, crude bitumen or products derived therefrom, the Board, in its discretion, may proceed without a hearing and without the authorization by the Lieutenant Governor in Council.

(4) An approval granted under this section shall be subject to the terms and conditions therein prescribed and, without restricting the generality of the foregoing, may stipulate the period during which the approval will be in force and the maximum volume or rate of production of oil sands, crude bitumen or products derived therefrom.

49d. The Lieutenant Governor in Council, upon the recommendations of the Board, may make general regulations or special orders

(a) governing operations to recover oil sands or crude bitumen or products derived from oil sands or crude bitumen and the abandonment of such operations,

(a1) governing the submission to the Board of information obtained by, or as a result of, drilling into or sampling oil sands,

(b) to exclude from the application of any provisions of this Act any oil sands or crude bitumen or products derived from oil sands or crude bitumen, and

(c) to make any provision necessary to effect the intent and purpose of this Part and not otherwise provided for.

49e. (1) Section 36 shall not be construed to apply in respect of crude bitumen or synthetic crude oil.

(2) With the approval of the Lieutenant Governor in Council, the Board may by general or special order restrict the total amount of crude bitumen or synthetic crude oil that may be recovered in the Province.

Board Policy Prior to October 1962

Even before the 1962 policy statement was issued the Board had been concerned about the impact of synthetic crude oil on the conventional market. In the Supplemental Report of September, 1962[1], commencing on page 39, the Board stated:

---

(1) Supplemental Report to the Lieutenant Governor in Council with respect to the Application of Great Canadian Oil Sands Limited under Part VIA of The Oil and Gas Conservation Act. September 1962. The application had first been heard in 1960 when it was deferred. It was reconsidered and new evidence with regard to several matters was received in June and July, 1962, thus leading to the Supplemental Report.

"The Board considers that there are three useful criteria which aid in assessing the impact of oil sands production on the conventional crude oil producing industry of the Province. These are the ratio of actual production to productive capacity, the life index (representing the number of years current reserves would support current production) and the proration allocation factor. The allocation factor is the fraction of the excess of productive capacity over the economic allowance which a well or pool is permitted to produce in addition to its economic allowance. Like the other two criteria it is one measure of incentive for future oil exploration and development."

October 1962 Policy Statement

In October, 1962, Premier E. C. Manning issued the "Government Policy Statement With Respect to Oil Sands Development". It is reproduced in this report as Part 1 of Appendix A. The Government's intent in the policy was to provide for the orderly development of the oil sands in such a manner as to supplement but not displace production from the conventional industry. The essential features of this policy were as follows:

(1) applications for oil sands production "able to reach markets clearly beyond present or foreseeable reach of Alberta's conventional industry" would be approved providing the development program meets the conservation and related requirements of the Oil and Gas Conservation Board, and

(2) applications involving the marketing of oil sands production "within reach of Alberta's conventional industry" would

(a) for initial development be restricted to a volume in the order of five per cent of the total market for Alberta crude oil, and

(b) for subsequent development be restricted to ensure that "market growth enables the conventional industry to produce at a greater proportion of its productive capacity..." and, with respect to the scale and timing of incremental oil sands production, by relating such production to "the life index of proven reserves of conventional oil...".

Board Interpretation of October 1962 Policy

(1) October 1963 Report

The Board first discussed the October 1962 policy in the 1963 report[2] dealing with the original applications of the applicants and an application by Shell Canada Limited.

---

(2) Report to the Lieutenant Governor in Council with respect to the Applications of Cities Service Athabasca Inc. and Shell Canada Limited under Part VIA of The Oil and Gas Conservation Act. October 1963.

In the 1963 report, it was assumed that all synthetic crude oil production proposed by the applicants from oil sands would be absorbed in markets which otherwise would be supplied by the conventional industry. Detailed studies and forecasts were made of the total market demand for Alberta oil, the percentage of productive capacity at which the conventional crude oil industry would operate, and the life index at which the conventional crude oil industry would operate. Commenting on the Government Policy, the Board stated:

> "Having determined that the proposed production in 1970-71 of 100,000 barrels per day of synthetic crude oil from the oil sands (in addition to the 31,500 barrels per day now authorized) is in excess of that which could now be authorized under Government policy there remains the question of how much could be authorized and when. To answer this requires, on one hand, some interpretation of Government policy and, on the other, a knowledge both of the total market demand for crude oil and of the productive capacity of the conventional industry. As has already been emphasized any estimates of market demand and productive capacity made 10 or more years into the future are subject to substantial uncertainties. Within the bounds of these uncertainties, however, the approximate timing and amount of additional oil sands production may be indicated if the policy outlined by the Government is interpreted in a quantitative way.

"The Government policy favours both growth in utilization of the productive capacity of the conventional industry and oil sands development. This means some kind of sharing of the market growth in excess of that required to maintain operation of the conventional industry at its current percentage of productive capacity. The Board has given consideration to what would be an appropriate manner of sharing, and believes that it would be reasonable if the 'excess market growth' were shared equally between oil sands production in competition with the conventional industry and the conventional industry, with the proviso that, in order to retain incentive for the continued growth of the conventional industry, it would receive (when market growth permitted) sufficient market to permit its use of productive capacity to grow to its practical maximum at not less than one percentage point per year."

Applying the result of the studies in the 1963 report to the Policy, the Board concluded that it seemed clear that it would be at least 11 years before a total of 100,000 barrels per day of oil sands production would fall within Government policy. It concluded its remarks on the policy by stating:

"Recognizing all of the uncertainties, however, it does now appear that under Provincial Government policy commercial exploitation of the oil sands in total amounts in excess of 100,000 to 150,000 barrels per day within

the next 10 or 15 years will be dependent upon the finding of markets not in competition with conventional crude oil. The development of such markets would permit earlier and larger production from the oil sands and be in the interest of the Province and those who hold leases in the oil sands areas."

(2) February 1964 Report

In OGCB Report 64-3[3], the Board commented on the Government Policy and its effect in relation to the application then before it.

At page 60 it said:

"Mr. Dunlop, giving evidence regarding disposition of Sun's share of the proposed increase in Great Canadian's production, stated that the 10,125 barrels per day his company could use at its Toledo refinery constituted a new market for this portion of the synthetic crude oil. If the Lieutenant Governor in Council and the Board were to consider the Sun Toledo refinery a market 'clearly beyond the present or foreseeable reach of Alberta's conventional industry', then, according to government oil sands policy, this portion of the production would be free from restriction under the policy. The Board takes the position that the boundaries to such markets

---

(3) Report on an Application of Great Canadian Oil Sands Limited under Part VIA of The Oil and Gas Conservation Act. February 1964.

are geographical, and would not be defined according to individual company policies within an existing market area. The Board considers the Toledo area to be clearly within the present and foreseeable reach of Alberta's conventional industry, as deliveries have been made on a regular basis in recent years to a number of refineries both in Toledo, and even further east, in western New York State."

At page 72:

"In closing argument both Pan American Petroleum Corporation and Cities Service Athabasca, Inc. claimed that the increased production rate sought by Great Canadian would delay other schemes and hence prejudice the position of others who are interested in developing the oil sands. The delay is one to be assessed not only in relation to the applications of Cities Service and Shell, which have been continued to December 31, 1968, but also relative to the plans of those others who are proceeding with studies and experiments in processing and extraction methods under the authority of Board approvals for experimental oil sands schemes, and to the position as a potential producer held by each owner of bituminous sands leases. Although not referred to by the interveners, but in accordance with Government policy, it is clear that the delay is only effective in so far as others may seek to market their product in competition

with Alberta's conventional crude oil."

At page 73:

"During the hearing the question was raised as to whether the Board would establish a precedent affecting any further similar applications. The Board does not consider that any decision that may be made on this application could be considered as a precedent or that any future application could be sufficiently similar to the present one that it would necessarily be assessed in a similar light."

In its findings in OGCB Report 64-3, the Board stated:

"5. WITH RESPECT TO THE IMPACT ON THE MARKET FOR CONVENTIONALLY PRODUCED CRUDE OIL

"The Board cannot accept the applicant's contention that the part of the increased production proposed which may be marketed in the Toledo area would go to a market beyond the present and foreseeable reach of conventionally produced Alberta crude oil. Accordingly, the Board must view the entire 45,000 barrels per day proposed production as being in competition in the market for conventionally produced crude oil. Such a volume would represent 7.5 per cent of the total market at the commencement of the proposed operations and would decline thereafter. While this may be beyond a narrow interpretation of 'the some 5 per cent' referred to in the Government policy statement, the Board believes that it falls within

the intent of the policy for the initial development in the oil sands area."

1968 Policy Statement

Between 1962 and 1968 there were several developments which had an impact on the effectiveness of the Government's oil sands policy.

In 1964 the Board announced a new plan for proration of oil to market demand which significantly affected the development of reserves in the conventional industry. A consequent re-appraisal of Alberta crude oil reserves resulted in increases in a number of fields. The plan increased the incentive for the institution of enhanced recovery operations leading to higher crude oil recoveries. The formation of production spacing units provided wider effective spacing and reduced the necessity for the development of unneeded productive capacity.

Exploration for crude oil during this period was more successful than it had been in the years immediately preceding 1962. In 1964 and 1965 discoveries were made at Mitsue and Nipisi. In 1965 the discovery in Rainbow brought about the Keg River oil play in North-west Alberta which is expected to continue for several years.

As a result of these developments, the life index for conventional crude oil in Alberta increased during this period from 22 years to some 31 years.

During 1967 and early 1968, members of the Government and representatives of the Board and industry associations discussed the oil sands policy in the light of the developments in the preceding years. Arising from such discussions there came a further statement "Oil Sands Development Policy" which was tabled by Premier Manning in the Legislative Assembly on February 20, 1968. It is reproduced in this report as Part 2 of Appendix A.

The principal impact of the new policy statement is as follows:

(1) The distinction between "within reach" and "beyond reach" markets is clarified. "Beyond reach" markets include any markets, including specialty markets, which Alberta's conventional industry is not now serving nor can reasonably be expected to serve in the foreseeable future because of price, quality specification or other reasons.

(2) Where it can be demonstrated that the applicants' proposal would provide growth by the development of a "new" market within reach of conventional industry, production from oil sands may be authorized in volumes equal to 50 per cent of the new market. However, the total volume of commercial oil sands production, including that already authorized, that will be permitted to enter new within reach markets, will be 150,000 barrels per day, which limit will remain in effect for 5 years.

(3) A scheme proposing marketing of oil sands production in a "within reach", but not "new" market, would be approved only

when indicated by a trend in the life-index of the conventional industry. The per cent utilization of productive capacity criterion is no longer useful and is discontinued.

(4) No change is made with regard to beyond reach markets.

(5) The policy of encouraging experimental operations in oil sands not involving commercial production is desirable. Such operations may involve temporary production and marketing at sub-commercial levels.

The new statement was a modification of the 1962 policy. The Board's interpretation of the resulting policy, which must be applied in conjunction with Part VIA of the Act, wherein the statutory authority lies, appears in Section V.

V INTERPRETATION OF POLICY

To assist in the discussion of the Oil Sands Development Policy, the Board has prepared the schematic table below to illustrate the differentiation of markets under the Policy. Approval of production under any of the market criteria listed is subject to the satisfaction of conservation requirements.

Table V-1

Commercial Oil Sands Production			
Beyond Reach Markets		Within Reach Markets	
Geographically Removed Markets	Specialty Markets	'New'	Other Than 'New'
No restriction.	No restriction.	Total "New' market equal to double the synthetic crude oil production must be provided. Maximum approvals under this criterion limited to 105,000 b/d* over 5 years.	Volumes as desirable to ensure the life index for conventional oil does not fall below 12-13 years.

* 150,000 barrels per day less the current Great Canadian Oil Sands approval of 45,000 barrels per day.

Although most of the comments by the applicants and the interveners focused on the specific marketing arrangements proposed for the plant production, certain comments involved or implied interpretation of the Oil Sands Development Policy. The Board has included such views where relevant in the following discussion. The discussion is patterned on the format of Table V-1.

Distinction Between 'Within' and 'Beyond Reach' Markets

The Board interprets a 'within reach' market as a requirement for oil which now or in the foreseeable future may reasonably be considered accessible to Alberta conventional crude oil. Accessibility would extend to the oil requirements of refineries not now supplied by Alberta crude oil in an area in which Canadian supplies are available. The fact of availability, now or in the foreseeable future, in the Board's opinion is sufficient to warrant treatment of such requirements as 'within reach'. As such, the Board believes the definition of 'within reach' markets at any one time is closely related to the current and prospective pipe line network by which Alberta supplies are, or may be, transported to the various refining complexes which generally constitute the oil market. Thus, with the exception of the specialty markets treated later, the Board considers the 'within reach' market concept to be one which is defined in geographical or areal terms. At the present time, 'within reach' markets would embrace refinery requirements in such areas as Canada west of the Ottawa Valley, Puget Sound and the Pacific Northwest portions of PAD District V, northern portions of the United States, including Montana, Wisconsin, Michigan, Minnesota, the Detroit-Toledo and Chicago refinery complexes and certain fringe markets such as Buffalo.

The interpretation of 'within reach' markets in this manner does not imply that all the demand for products derived from petroleum in the geographic area bounded by such markets

is necessarily capable of being economically satisfied by Alberta conventional oil, now or in the foreseeable future. As the Board sees it, the concept of 'within reach' markets does not itself require any specific degree of penetration of Alberta oil: rather, it sets the boundaries of areas in which Alberta oil could be marketed. This interpretation is consistent with the Board's previous comments concerning 'within reach' markets in OGCB Report 64-3[(1)], where the Board took the position that "the boundaries to such markets are geographical, and would not be defined according to individual company policies within an existing market area".

On the basis of the Board's interpretation of 'within reach' markets outlined above, 'beyond reach' markets would generally constitute any markets clearly beyond the geographical area bounded by the 'within reach' distinction and would also include specialty markets which may be geographically located within reach, but which the Canadian conventional industry may not be reasonably expected to serve, either now or in the foreseeable future.

'New Within Reach' Markets

A 'new' within reach market was defined in the 1968 Policy as one "not being served today; one over and above the normal growth in existing markets; and one representing a net increase in total market".

---

(1) p. 61, Report on an Application of Great Canadian Oil Sands Limited under Part VIA of The Oil and Gas Conservation Act. February 1964.

(1) Views of the Applicants and Others

The applicants interpreted a 'new' within reach market as a "sales opportunity that would not be available to conventional Alberta crude but for some action of a permit holder motivated by policy requirements. It may be within a geographic area or a refinery now taking Alberta crude. Hence, all crude inputs above the amount of Alberta crude now going into a given geographic area or a given refinery, is a market 'not being served today'. However, only that portion of this market which is in excess of 'normal growth' would qualify as a 'new' market, and then only if the increase constituted a net increase in the total market. The consumption of Alberta oil must not be reduced simultaneously elsewhere." The applicants expressed the belief that proprietary interests provided incentives for the use of non-Canadian oil in within reach markets and thus would be relevant in the definition of 'new' markets.

Chevron contended that such matters as proprietary incentives and intra-company arrangements were not relevant to the definition of markets under the Oil Sands Development Policy. IPAC believed that 'new' markets could not be justified by subjective statements of individual company preferences and implied that such 'new' markets could not be located in areas currently within the geographical ambit of Canadian supplies. Some elaboration of these views is given in Section XII.

(2) Views of the Board

'Markets not served today'. The Board recognizes that Canadian oil has not achieved a saturation level in certain areas of the 'within reach' orbit, as is the case in the 'within reach' market examples cited previously of Detroit-Toledo and Chicago. Thus, the Board sees 'markets not served today' as embracing all 'within reach' requirements for oil not satisfied by Canadian sources of supply. This definition includes the requirements of refineries not using Canadian oil and that portion of feedstock requirements of refineries using Canadian oil not satisfied by such supplies.

'Markets over and above normal growth'. The Board interprets this provision as implying that the absorption of a 'new within reach' market by Alberta oil in essence must increase the level of market penetration by Canadian supplies at least over the medium term. Such a process may involve the accelerated acquisition of a market which might have been served equally well by Alberta conventional oil albeit at some indefinite time in the future. It may also involve the acquisition of a market which, although potentially available to Alberta supplies by virtue of geographical location - and thus qualifying as a 'within reach' market - may nevertheless be unlikely to utilize Alberta sources of supply in the foreseeable future. The Board agrees with the applicants that proprietary interests are an important factor in the delineation of 'new' markets. The Board is convinced that such interests provide incentives to modify

the refinery supply pattern which might otherwise prevail and hence offer a means of establishing markets over and above normal growth.

The Board believes that 'normal growth' may embrace such elements as the growth in feedstock requirements for refineries heavily dependent upon Canadian supplies, increased penetration of refineries exhibiting a trend towards increasing use of Canadian oil and satisfaction of the feedstock requirements of new refineries with no alternative sources of supply.

<u>Markets providing 'a net increase in the total market'</u>. A market satisfying the above criteria nevertheless may not be classified as 'new within reach' if the absorption of Alberta supplies in such a market displaces, or precludes the normal growth in, Canadian supplies to other portions of 'within reach' markets. This situation may well arise in certain export markets when the export of Canadian oil is subject to formal or informal restraints. (The existence of such restraints is discussed in Section XI). Under such conditions, increased deliveries to one refinery may be at the expense of deliveries of Canadian supplies to other refineries. Consequently, the market concerned would not satisfy the condition of achieving a 'net' increase in the total market.

Other Within Reach Markets

The within reach markets not qualifying as 'new' markets constitute 'other' within reach markets. Synthetic crude oil production marketed in such 'other' markets will only be authorized when justified by the trend in the life index. The 1962 statement refers to "relating the scale and timing of increments of oil sands production also to the life index of proven reserves of conventional oil allowing the life index to decline gradually from present levels but ensuring that it does not drop below 12-13 years". Appraisal by means of this criterion requires the estimation of future trends in reserves and production of Alberta crude oil. Details of this aspect of the Oil Sands Development Policy are given in Section IV.

Beyond Reach Markets

Beyond reach markets include not only those that are geographically remote from the within reach markets but, through the 1968 clarification of the Oil Sands Development Policy, they also include specialty markets within the geographic limits of the within reach markets. A market such as one in Japan would now qualify as beyond reach by virtue of geographic remoteness since it is unlikely that Alberta conventional oil would supply this market in the foreseeable future. Specialty beyond reach markets may exist by virtue of 'price, quality specification or other reasons'. An instance where price may define such a

market would be when indigenous supplies compete with imported products; quality specifications may be involved in the market for certain fuel oils to be used in areas subject to pollution controls.

Other Matters

(1) Qualification Over Term of Permit

The term of an approval for a commercial project will normally extend to 20 or 25 years. The Board does not consider that production which satisfies one of the marketing criteria of the policy at the time of the issuance of an approval will necessarily require perpetual compliance under the same criterion for the entire term of the approval. For example, approval of an application under the provision which allows for the disposition of plant products in a 'new within reach' market does not preclude, in the Board's opinion, reapplication for qualification under another criterion in the future.

(2) Technology and Scale of Operation

Frequent reference was made in submissions and in evidence at the hearing to the Province's objective of maintaining a lead in synthetic crude oil production technology. The only explicit reference to this objective in the Oil Sands Development Policy is contained in that part of the 1968 statement concerning the Board's preliminary recommendations to the Government respecting clarification and amendment of the 1962 policy statement. The Board alluded to the desirability of the Province

maintaining "its technological position as a source of synthetic crude oil having regard to potential developments elsewhere - especially in the oil-from-coal and oil-from-shale programs in the United States". By implication, the Government concurred with this objective.

Views were expressed by both the applicants and the interveners concerning the method by which the production limit of 150,000 barrels per day for 'new' within reach markets should be allocated amongst proposed oil sands development projects. The Board believes it appropriate to raise here all matters which have a bearing on the general interpretation of the subject aspect of the Bolicy, even though the views expressed were in some cases confined to consideration of the current application.

Views of the Applicants. The applicants appeared to take the view that the production limit should be allocated among those proposed projects which offer significant advances in oil sands production technology.

Regarding the acceptable scale of proposed oil sands projects, the applicants expressed the belief that a project should be sized near but somewhat above the minimum economic level. In this way, room would be left for additional projects while each could have a strong competitive position relative to other developing synthetic crude oil sources.

The applicants held the view that a series of mining type projects will be required before the processes, through technical modification, achieved optimum efficiency. A parallel was

drawn with the developmental stage of other process industries, where process costs were greatly reduced as successive plants were built. The applicants stated that "the long term future of Alberta as a supplier of crude oil will depend upon well timed increments of synthetic crude capacity" and that it was time for another such increment.

Views of the Interveners. Canadian Fina expressed the belief that granting of an approval for a proposed project was similar to granting a franchise and thus only minimum sized facilities should be approved. This procedure would leave room for development of alternative or improved processes. Canadian Fina said that very large projects which would use up most or all of the remainder of the production limit would tend to negate the technological development objective of the Policy. Great Plains and Mobil supported the view that smaller projects would provide more opportunity for improvements in technology.

Mobil, Great Plains and Pan American took the position that opportunity should be left within the 150,000 barrels per day limit for in situ recovery projects. Mobil believed that "the allowable assigned to each process should recognize the quantity of synthetic crude oil potentially recoverable by each process". It was the contention of Great Plains that a portion of the limit should be retained for the Cold Lake oil sands and similar deposits to encourage research on in situ methods. Mobil and Great Plains stated that in situ projects could possibly require much less time for design and construction than would a mining

type project. Because of the long lead time involved, approval of a mining project would tend to depress interest in in situ processes for a considerable period.

Views of the Board. With respect to 'beyond reach' markets, the policy makes it clear that for any project meeting adequate conservation standards there would be no other restrictions, including ones related to technology, affecting its approval. At the present time, an upper limit on the volume of production from any one plant satisfying 'new within reach' markets is exerted by virtue of the 105,000 barrels per day limitation - after deduction of the current permit volume - stipulated in the 1968 policy statement. No specific injunction is included within the policy as to whether the Board should have regard for the number of potential applications in determining how much of this fixed allocation may be absorbed by one application. However, the apparent concurrence of the Government in the objective of maintaining a technological position for oil sands projects in comparison to other potential developments implies that encouragement should be given, to the extent feasible, to technological variety. As such, the Board believes that, other things being equal, preference should be given to proposals which feature new or markedly improved technological processes. If realizable, the satisfaction of this objective may imply a constraint on the volume of production supplying

'new within reach' markets under any one approval to prevent plants employing conventional technology from excluding others offering a greater degree of new technological content. However, this factor would simply be one element to be weighed in any decision and would not necessarily override other objectives.

The Board does not believe it desirable to allocate a portion of the production limit for 'new within reach' markets to particular types of recovery processes or particular oil sands deposits. In the Board's view, there is no policy basis for making such allocations. In fact, the Policy might be frustrated and total oil sands development might be reduced if projects were not later proposed to make use of reserved allocations. The Board believes there should be no specific restraint against the approval of a project which would employ conventional technology if there were no applications forthcoming for projects offering new or significantly improved processes.

With regard to the scale of operations at a particular plant, the Board agrees with the applicants' view that a modest cushion of production volume should be permitted above the minimum economic rate of production. The cushion would recognize the risks involved and provide a measure of competitiveness to oil sands production.

For production satisfying 'other within reach' markets, an inherent limitation on the scale of operation is provided by the

terms of the 'within reach' criterion: the displacement of too great a volume of conventional oil may increase the life index for conventional crude oil beyond the critical levels which would justify approval of an application. In addition, the preference for the encouragement of new technology would also apply, as referred to beforehand.

(3) Degree of Proof

A further matter of some importance concerning the interpretation of the Policy is the degree of proof which an applicant should be expected to provide with respect to compliance with the marketing provisions of the Policy.

With respect to "beyond reach" markets, whether geographically so or for other reasons, the Board sees little reason why an applicant should not be able to provide evidence sufficiently convincing as fully to demonstrate compliance with Policy. Here the questions are only whether the market is or is not, and will or will not be, served by the conventional industry, and these are matters capable of reasonably close determination.

In the case of "new within reach" markets the situation is far more difficult, for the applicant is required to show that a particular market, within the marketing radius for Alberta, is not being served today, is above normal growth, and represents a net market increase. And this must be demonstrated say five years in advance of the market being served. Further, if the proposed "new" market is in the United States all of the uncertainties of forecasting the attitude of the United States towards imports of oil from Canada are introduced.

The Board believes that if it were to require or expect absolute proof that a marketing plan qualified under the "new within reach" provisions of the Policy it would, in effect, be negating the intent of the Policy, for proof absolute would be essentially impossible for an applicant to provide. Instead the Board believes the applicant should demonstrate that, all the uncertainties considered, the balance of probabilities strongly favours the conclusion that his marketing plan, in or very near the instance of first production and thereafter in the foreseeable future, would meet the qualifications of the Policy. In the necessarily qualitative weighing of the factors involved the Board considers that the magnitude of the proposed "new within reach" market, relative to the total Alberta market, is an important matter because of the consequences in the event that a marketing plan believed to be in full compliance with the Policy turned out differently.

Finally, there is the case of the "other within reach" market which might qualify because of the indicated trend in in the life index for Alberta conventional crude oil. Here the Board considers the unavoidable uncertainties are of the same magnitude as for the "new within reach" markets and accepts that an applicant should not be expected to provide absolute proof of the compliance of his marketing plan with the Policy. The Board believes the same considerations discussed in the preceding paragraphs with respect to the "new within reach" markets should apply.

VI MATTERS OF PRINCIPAL INTEREST

In considering the application under the provisions of the Act, the Government policy statements and the Board's interpretation of the overall policy, the Board sees the following principal issues:

(a) conservation and related matters,

(b) technical feasibility,

(c) economic feasibility and the financibility of the project,

(d) the marketing plan.

(a) Conservation and Related Matters

The Board's concern with conservation and related matters embraces the recoveries anticipated in each of the mining, processing and upgrading steps, and the disposition of the solid, liquid and gaseous wastes. With respect to recoveries in the mining operation, the Board's interest extends to the question of the extent to which an operation may facilitate or impair future mining and recovery of oil sands not planned for mining in the operation being considered. While the Department of Health has primary Government responsibility for pollution matters, the Board is properly concerned with certain pollution matters by reason of its interest in conservation of hydrocarbons and by-product sulphur and also because it endeavours to assist the Department in pollution problems originating in the oil and gas industry.

(b) Technical Feasibility

Associated with its conservation concern the Board believes it proper that it should have a good technical understanding of the proposed mining, extraction and upgrading operations. While it does not consider it necessary that the applicant disclose all technical detail and especially process detail of corporate and competitive value, it believes that its technical understanding should be adequate for it to form a general judgment as to the technical feasibility of the undertaking. The Board emphasizes, however, that it does not consider it the Board's responsibility to rule in any absolute sense on the technical feasibility of the project.

(c) Economic Feasibility and Financibility

With respect to economic feasibility and financibility the Board's concern is even more general. It believes it should have a sufficient understanding of the capital and operating costs of the project to form a general judgment that the project is at least within the range of being economically feasible and also that the applicant has a financing plan that appears generally suitable and probable of success. However, the Board considers that the detailed assessment of economic feasibility and financibility is properly the responsibility of the applicant involved. Consequently, the Board does not believe it is incumbent upon it to make a finding in any absolute sense with respect to economic feasibility and financibility.

(d) The Marketing Plan

For a project which meets adequate conservation and related standards and for which the Board is generally satisfied as to the technical and economic feasibility and the financibility, the remaining concern, and a vital one under present circumstances, is whether the marketing plan is compatible with the intent and the specifics of the Oil Sands Development Policy of the Government. Here the Board considers it necessary to explore the details to the extent that the applicant is able and prepared to disclose them. To the extent that important details cannot be determined or are not disclosed the applicants' case must be considered weakened. On the other hand, as discussed in Section V, the Board recognizes the virtual impossibility of all factors being resolved and believes that its finding as to the suitability of the marketing plans must be based in part on a weighing of probabilities. In such a weighing the Board must be influenced by the broad intent of the Government policy.

For an adequate appraisal of the particular marketing plan of the applicants the Board must have a good understanding of a number of rather complex matters related to the markets for and the marketing of crude oil and certain products. These include:

(a) the supply of and demand for Alberta crude oil,

(b) the supply of and demand for heavy fuel oil in Canada and the Great Lakes area of the United States,

(c) the domestic supply of and demand for crude oil in the United States,

(d) the United States oil import program.

(a) The Supply Of and Demand For Alberta Crude Oil

In as much as the broad intent of the Oil Sands Development Policy is that oil sands production should supplement rather than displace production of conventional crude oil and one of the measures of this is the trend in the life index for conventional crude oil, the Board must appraise the trends in growth of the supply and demand for Alberta crude oil. The appraisal of the growth of supply relates only to the development of Alberta's reserves. That of the growth of demand involves the growth in all markets served by the conventional industry and the impact of changing volumes of supply from other sources, notably British Columbia, Saskatchewan and the Northwest Territories.

(b) The Supply Of and Demand For Heavy Fuel Oil in Canada and the United States

The applicants' contend that part of their proposed production will serve a "specialty market" beyond reach, for various reasons, of the conventional industry. This market is the heavy fuel oil market in Ontario and British Columbia and the Great Lakes areaof the United States. This means that the Board must consider the supply of and demand for heavy fuel oil primarily in Canada but also in adjacent areas of the United States. In this connection Canada's National Oil Policy is relevant.

(c) The Domestic Supply Of and Demand For Crude Oil in the United States

The applicants propose that most of their production would reach "new" markets in the United States. The starting point for an appraisal of this is an understanding of the present and the probable future relationship of the domestic supply of and the demand for crude oil in the United States. In the future domestic supply, consideration must be given not only to the present producing areas of the United States but to the possible development of new indigenous sources of conventional crude oil, such as the new discoveries in Alaska, and of synthetic crude oil from coal or oil shale. For these reasons the Board must consider the United States supply-demand balance and make a finding as to the probable future trend in the requirements which will be met from sources outside the United States. Also an appreciation of the United States supply-demand balance is important to an understanding of the United States oil import program.

(d) The United States Oil Import Program

Even when the United States requirements from non-indigenous sources are reasonably projected, their significance in relation to the present application is greatly dependent upon the future United States oil import program - whether imports from offshore will be limited and if so to what extent, and whether there will be controls or restraints on imports from Canada. This is a most difficult matter and one which the Board knows at the outset it cannot resolve with complete confidence. Nonetheless,

the Board considers that, with the aid of the evidence of the applicant and the interveners, it must appraise this matter to the best of its ability.

In the following sections of this report the submissions of the applicant and the interveners and the appraisal of the Board are given on each of the main issues, and in relationship to the marketing plan, the four important matters of background are each discussed.

VII CONSERVATION, TECHNICAL AND ECONOMIC MATTERS

Conservation and Pollution

(1) Views of the Applicants

The applicants predicted an overall mining recovery of 90.7 per cent of the crude bitumen in place in the initial mining area, and 87.0 and 86.6 per cent, respectively, in the areas designated A and B on Figure 2. The principal loss would occur in the material in the ore body which would be rejected on the basis of grade or sand thickness criteria. The average bitumen content of the reject material in the initial mining area was estimated to be 2.1 weight per cent. The applicants contended that it would not be economically feasible to process the reject material or stock pile it for possible future bitumen extraction. They further estimated that two per cent of the bitumen in place would remain in the walls of the mining pits but predicted that some of this may be recovered during pit expansion although such recovery was not allowed for in the two per cent loss estimate. The quantity of bitumen in the material rejected on the bases of grade and thickness criteria would be approximately nine per cent of the total bitumen in place. The two per cent losses in pit walls would bring the total mining losses to an average of 11 per cent for the 25-year mining area.

There is a seven-acre area on the south boundary of the 25-year mining area which the applicants stated they believe is unmineable due to an excessive ratio of overburden to oil sands. The oil sand thickness in this area is of the order of

20 feet, and the ratio of overburden to oil sands is a minimum of ten to one.

Certain permanent losses of bitumen would occur outside of the mining areas as a result of the proposed project operations. The applicants estimated that the bitumen in place in the plant area and the initial tailings disposal area would be 28.6 and 250 million barrels, respectively. The applicants stated that the bitumen underlying the plant area would become permanently unrecoverable. An alternative plant site in an adjacent area of lower bitumen reserves was found to be much less desirable as a building site.

The applicants' position regarding the eventual recovery of bitumen reserves underlying the initial tailings disposal pile is not absolutely clear. The written submission considers these reserves under the heading "Economically Unmineable Reserves" and groups them with the reserves under the plant site. Although the submission mentions that the reserves under the retention pond would not be permanently lost, no mention is made of the eventual recovery of the reserves in the initial tailings area. Both the submission and direct evidence referred to the relative poorness of the reserves under the proposed tailings pile.

On the other hand, the applicants submitted at the hearing that "it would be possible to expose the underlying reserves after all other areas had been mined out." This, they said, would be some 60 or more years away. Mr. Haston, of Syncrude, testified somewhat more positively, "As we pointed out in dis-

cussing the lost reserves, the tailings disposal area (reserve) has not gone forever.....by leaving a major disposal area close to the tailings pile it would be possible to hydraulic the tailings pile into a hole in mined-out areas in order to dispose of some of the reserves underneath that pile." When asked if the cost of removing the tailings had been considered, Mr. Haston said that the applicants had an estimate of the cost per year of moving the tailings.

Mr. Haston said that the only possible site for initial tailings disposal in an area considered unmineable would be in the Area U1 shown on Figure 2. He said it would be impractical to dispose of the tailings in this area because it is poorly located with respect to materials handling and especially with respect to clarification of the water drained from the tailings. He also said that there is only limited evidence to show that the area is definitely unmineable. Mr. Haston also said that it would be somewhat difficult with the proposed disposal method to rearrange the proposed disposal area to avoid covering subareas which have thick sections of oil sands feed.

The applicants stated that the oil sands under the retention pond area would not be permanently lost and that the sludges from the area could be dredged and settled on mined out areas.

In the extraction-dehydration phase, the applicants predicted that the bitumen recovery would average about 93.5 per cent and would vary only slightly depending upon the feed being processed. The losses would be about 0.5 per cent on the slurry

screens and about 3 per cent each in the tailings and effluent water. The increase of 8.5 per cent over the recovery predicted in 1963 was credited by the applicants to studies conducted in their Edmonton laboratory and resultant improvements in extraction technology.

The applicants stated that it would not be economically feasible to process oil sands which contain significantly less than six weight per cent bitumen. The recovery from such lean sands would be markedly less than from normal feed, and the equipment requirements would be excessive.

The production of saleable liquid hydrocarbon products leaving the upgrading phase was predicted by the applicants to be 87.2 volume per cent or 73.5 weight per cent of the input of hydrocarbons (bitumen and some dehydrator gas oil). Essentially no waste would occur in this step, however, because the gaseous and residual oil streams leaving upgrading would be fully consumed as fuel, in hydrogen production or sulphur extraction.

Table VII-1 is a summary of the hydrocarbon recoveries on a weight per cent basis as predicted by the applicants. The comparable overall volume per cent recovery would average about 72.5 and range from 70 to 74.

Table VII-1

LOSSES AND RECOVERY EFFICIENCIES

(Weight per cent based on total crude bitumen in place)

Step	Losses		Recovery		Cumulative Recovery
	%	Description	%	Description	
Mining	11	reject materials and dikes	89	plant feed	89
Extraction & Dehydration	6.5	screenings, tailings and effluent water	93.5	raw bitumen	83
Upgrading	26.5	fuel, sulphur and hydrogen plant feed	73.5	liquid hydrocarbon products	61

The applicants' submission indicates that of the 712 long tons per day of sulphur entering the upgrading phase, 472 long tons or 66 per cent would be recovered as elemental sulphur. They stated that there is a possibility that sulphur recovery could be increased to more than 70 per cent if it proved possible to recover part of the 48 long tons per day from the sour water stripper. The daily quantities of sulphur in other upgrading output streams would be 29 long tons in the hydrocarbon products, 152 long tons in the plant fuels (residual oil and a butanes fraction of the fuel gas), and 11 long tons in the sulphur plant incinerator stack gases.

The applicants stated that the sulphur recovery unit was designed to recover 97.8 per cent of the sulphur in the inlet gas. They said that they could not guarantee recovery at this level but would not object if the Board required a 95 per cent recovery.

The applicants' plans for the disposal of solid and liquid wastes have been described in some detail in Section II. Their submission indicates that the Department of Health has expressed preliminary satisfaction with the approach taken by the applicants to water pollution control. They stated that should decanting of water from the retention pond to the Athabasca River prove necessary, it would be done to the satisfaction of the Department.

The main air pollution component, sulphur dioxide, would originate mainly from the combustion of fuels, but also from the sulphur plant incinerator and the sour water stripper. The total sulphur dioxide emission rate would be 475 tons per day, about two-thirds of that expected from the project proposed in 1963.

Mr. Haston of Syncrude said that the clays contained in the residual fuel oil could cause air contamination by fly ash but collectors could be installed to control the ash emission rate to the satisfaction of the Department of Health.

Mr. Haston remarked that, in light of the applicants' experience at Mildred Lake, he believed there should be sufficient binding material in the tailings to prevent a dust problem in the vicinity of the tailings piles.

The applicants indicated that preliminary discussions have been held with the Department of Health, but further and detailed consideration of air pollution control measures by Syncrude and the Department would be necessary.

(2) Views of the Interveners

No views were expressed by the interveners concerning resource conservation, pollution control, or other related matters.

(3) Views of the Board

The Board's staff has studied the reserves of bitumen in the mining areas and other areas affected by the proposed operations and has found itself in substantial agreement with the applicants' assessment of bitumen in place and recoverable bitumen.

Based upon present technology and subject to review after experience has been gained, the Board is satisfied with the applicants' proposals regarding selection criteria in the mining operation. The Board agrees with the applicants that there is insufficient justification at this time for providing for the storage of rejected bituminous material for further processing. It is satisfied that the proposed mining plans will keep the loss of bitumen in pit walls to a practical minimum. The Board considers it important that the lease-line losses of bitumen be kept to a minimum by co-operation between the owners. Although this matter would not be of great concern in the 25-year term proposed for the project, it would be important in future years.

In assessing the impact of the proposed project on the future recovery of bitumen reserves outside the mining area, the Board agrees that the plant area has been suitabley located and that bitumen losses in this area are essentially unavoidable. At the appropriate time studies should be made and submitted to the Board regarding recovery of the reserves underlying the sludge retention pond.

The Board considers the reserves of bitumen in the proposed initial tailings disposal area to be substantial in size and, for the most part, economically mineable under original overburden conditions. In the Board's view, the applicants do not appear to have studied in detail the logistics and costs of recovering these reserves after the area has served its purpose for tailings storage. The Board is also concerned that additional reserves in the vicinity of the plant site would be rendered unmineable due to accessibility problems if the ultimate removal of parts of the initial tailings pile were not economically feasible. While the Board recognizes that it is impossible fo forecast what circumstances will prevail in 60 years time, it believes that the applicants have a responsibility, before proceeding with the construction of dikes, to study these matters further and if possible to devise alternatives so that significant reserves would not be rendered unmineable.

The Board is satisfied with the recovery efficiencies predicted for the extraction-dehydration and upgrading phases. In the interests of conservation and air pollution control, it would be desirable to recover sulphur from the sour water stripper and the utility plant stack gases. The Board believes that investigation of the possibility of such recovery should be continued.

For the areas planned to be mined, the Board notes the marked improvement which the applicants expect to achieve in the overall project recovery efficiency compared with previous estimates for oil sands projects. The Board considers this a significant advance in oil sands production technology.

The Board notes that the Department of Health has been informed of the applicants' plans and appears to have no objection to the general approach taken to air and water pollution control. While final design details must be completed to the satisfaction of the Department, the Board does not anticipate that any serious pollution control problems would arise due to the proposed operations.

The Board believes that surface restoration measures will require careful planning, but no serious difficulties should be encountered in restoring the surface to acceptable standards.

Technical Feasibility

(1) Views of the Applicants

The applicants stated that the project which they proposed would be an improvement over any now operating and is improved in a number of ways relative to the project which they proposed

in 1963. They said that each process step to be used had been proven to the extent necessary, and no further research need be done.

(2) Views of the Interveners

The interveners expressed no views concerning the technical feasibility of the proposed project.

(3) Views of the Board

Investigations by the staff and the questioning of the applicants' witnesses at the hearing did not, in the opinion of the Board, raise any serious question as to the technical feasibility of any phase of the proposed project. The improvements proposed since 1963 would appear to substantially enhance the practicability of the project.

It is the Board's view that the proposed sequence of operations has been adequately tested, and that technical feasibility considerations should not stand in the way of the approval of the project.

Advancement of Technology

(1) Views of the Applicants

As discussed in Section II, the applicants contended that the proposed project would contribute significantly to the advancement of oil sands production technology. Major improvements were claimed with respect to methods of mining, bitumen extraction and bitumen upgrading, and in overall recovery. The applicants emphasized that the hydrocarbon recovery of the proposed project would be 70 volume per cent or more, while the recovery predicted in their 1963 proposal was substantially less, being 60.5 volume per cent.

(2) Views of the Interveners

Mobil took the position that although the proposed project incorporates improvement it was still a mining project and would not contribute substantially to new and different technology. Mobil contended that in situ projects would have much wider application in the oil sands.

Dome questioned whether the proposed mining and processing methods were much different than the ones now in effect.

Several interveners alluded to the possibility that research on in situ production methods in oil sands would be retarded if the proposed project were approved.

(3) Views of the Board

The Board agrees with the applicants' contention that significant technological gains would be made if the proposed project were proceeded with, but recognizes that these improvements would be restricted in their application largely to mining-based operations. The Board accepts that approval of the proposed project might have some adverse effect on the rate of development of in situ recovery processes but does not consider it advisable to restrict the development of mining methods, if they conform with all other requirements of the policy, in favour of the possible development of other methods not yet proposed.

The Board believes that approval of the proposed project would be consistent with the Province's objective of maintaining its relative technological position with respect to the production of synthetic crude oil.

Scale of Operations

(1) Views of the Applicants

The applicants stated that the optimum size for the project, in the technical sense, would be in excess of 100,000 barrels per day of synthetic crude oil. The 80,000 barrels per day level for production of varied products was tested by each applicant and was the minimum acceptable level. They stated that this level was close to, but somewhat above, the minimum economic size. When the applicants' policy witness, Mr. Kieschnick, was asked at the hearing whether or not they would proceed at a level of 60,000 or 70,000 barrels per day if some of the proposed markets failed to meet the "policy test", he replied that the applicants would meet to consider the implications and consequences involved.

(2) Views of the Interveners

Canadian Fina contended that the proposed project, if approved, should be scaled at the minimum economic level. In the opinion of Canadian Fina, the evidence from the hearing indicated that the applicants should be able to proceed with a smaller plant.

Several of the other interveners were concerned that the scale of the proposed project would leave little room for other types of projects within the 150,000 barrels per day five-year production limit for within reach markets.

(3) Views of the Board

The Board agrees with the applicants that the scale of the project is appropriate relative to the intent of the Oil Sands Development Policy and the need for some economic cushion as

discussed in Section V. Furthermore, as the Board sees the situation at the present time, the approval of this application would not preclude the possibility, within the Policy, of approving other applications offering further technological variety.

Economic Feasibility and Financibility

(1) Views of the Applicants

As indicated in Section II, the applicants' estimate of the total project investment costs, allowing for price escalation, was $192,500,000. This figure excluded research and pilot plant costs. Annual capital costs were estimated to average $3,000,000. The estimate of operating costs, including utilities, was $26,300,000 per year. Not included in this latter figure were depreciation, interest, income tax, pipe line tariffs or Crown royalty.

The average gross revenue, based on the applicants' estimates of Edmonton prices for liquid hydrocarbons and plant site price for the sulphur, would be approximately $78,220,000 per year. The revenue would be higher if the price received for the synthetic crude oil or specialty oils exceeded the estimated minimum prices of $2.75 and $2.00 per barrel, respectively.

In reply to numerous questions at the hearing regarding costs items, the applicants' witnesses affirmed that proper allowance had been made for price escalation and that all proper cost items were included. They also supported their estimates of the product prices.

The applicants did not present any form of economic analysis of the proposed project.

With regard to financing, each of the participating companies would make arrangements for financing its share of the project. The method or methods of financing which each applicant would choose would depend upon the relative advantages of the alternatives available to it at the time the financing was required. Each of the applicants submitted an audited financial statement as of December 31, 1967, as an indication of financial responsibility.

(2) Views of Interveners

Chevron and other interveners attempted at the hearing to obtain from the applicants a more detailed knowledge of the project economics. The interveners presented a number of arguments in support of their contentions that the Board should be fully informed by the applicants concerning estimated project costs, and that cost evidence should be subject to scrutiny at the hearing. After considering the matter, the Board ruled that the applicants would not be required to provide cost details except with regard to the figures provided in the submission.

Based upon the statement of Mr. Kieschnick referred to above, and upon consideration of favourable mining, royalty and pipe line tariff circumstances, Canadian Fina concluded that a facility smaller than that proposed might be equally feasible.

No other views or evidence were presented by the interveners with respect to economic feasibility or financibility.

(3) Views of the Board

As indicated in Section VI, the Board considers that its responsibility in appraising the economic feasibility of a proposed oil sands project is limited to forming a general judgment as to whether or not the project is within the range of being economically feasible.

In the opinion of the Board, the economic data submitted by the applicants coupled with their willingness to invest in the project provide sufficient basis for the Board to conclude in a general way that the project appears to be economically feasible.

Although the final form of financing has not been presented, the Board has no reservations concerning the ability of the group to finance the project.

VIII SUPPLY AND DEMAND FOR ALBERTA CONVENTIONAL CRUDE OIL, 1967 - 1980

Reserves

(a) Views of the Applicants

The applicants anticipated that Alberta's initial proved conventional crude oil reserves would grow from 9,200 million barrels in 1967 to 16,800 million in 1980. No details of the basis for the forecast were disclosed at the hearing.

(b) Views of Chevron

Chevron adopted Alberta's historical average annual reserve growth over the past 20 years of 450 million barrels per year for purposes of evaluating trends in the life index of Alberta's conventional proved oil reserves. Thus, Chevron forecast that Alberta's initial crude oil reserves would reach some 15,300 million barrels by 1980.

(c) Views of Dome

Dome also used Alberta's historical reserves growth of 450 million barrels per year in evaluating trends in the Alberta life index, but believed that this projection would prove to be conservative: it did not represent their 'best' estimate. In addition, Dome cited data from the Canadian Petroleum Association indicating that Alberta's historical proved and probable reserves growth had been some 550 million barrels per year.

(d) Views of the Board

A forecast was prepared by the Board of light and medium conventional oil reserves which involved an examination of

potential appreciation of reserves in currently existing pools and an assessment of likely levels of future discoveries and their appreciation. The appreciation analysis included appraisal of both future development and increases in recovery factors. In the case of future discoveries, an analysis was made having regard primarily for the extent of unexplored sediments and the characteristics of formations wherein reserves have been developed. On this basis, the Board forecast that Alberta's initial proved light and medium crude oil reserves would reach some 15,700 million barrels in 1980. Of this total, the Board estimates that some 11,700 million barrels represents the appreciated reserves of currently existing pools, and some 4,000 million barrels represents the appreciated reserves of currently undiscovered pools. The pattern of growth assumed by the Board utilized a higher rate of growth during the initial forecast years, and a declining rate thereafter. The average annual growth over the entire forecast period was some 480 million barrels, which is close to the Board's current estimate of the historical long term growth rate. In addition, the Board has made judgment adjustments to this base forecast to obtain 'high' and 'low' reserve estimates. The average annual growth for these cases is some 600 and 380 million barrels respectively.

Further details of the various reserve forecasts are shown in Table VIII-1 below:

Table VIII-1

Forecasts of Alberta Initial Conventional Crude Oil Reserves (millions of barrels)

Year	Applicants	Chevron and Dome	Board*		
			Low	Medium	High
1967	9,200	9,400	9,400	9,400	9,400
1970	11,500	10,800	10,850	11,100	11,450
1975	14,500	13,000	13,000	13,750	14,650
1980	16,800	15,300	14,400	15,700	17,200

* Excludes heavy crude oil

Demand

(a) Views of the Applicants

Domestic Demand for Canadian Oil. The applicants' projection was based on an energy forecast which embraced estimates of population growth, employment, gross national product and capital expenditure. The demand projections by source included petroleum products, natural gas, coal and coke, hydroelectricity, nuclear electricity and wood. The share of each source was a function of availability, convenience and price. Projections by end use related to automotive power, residential, commercial and industrial fuel consumption, thermal and nuclear power generation. The applicants' study indicated that energy demand in Canada would increase annually at a rate of 4.3 per cent from 1966 to 1985. During the same period demand for petroleum was projected to increase annually at 4 per cent. On this basis, domestic demand for Canadian crude oil and pentanes plus was

anticipated to rise on average by 3.2 per cent per year, from a level of 632 thousand barrels per day in 1967 to 1,120 thousand barrels per day in 1985. The volumetric average increase was some 27,100 barrels per day, as compared to the average over the last five years of 30,200 barrels per day.

Of the average 27,100 barrels per day, some 16,300 barrels were located in Ontario and 10,800 barrels per day in British Columbia and the Prairie Provinces, including the Northwest Territories.

Export Demand for Canadian Oil. The export demand for Canadian oil was predicated on a study by the applicants of the demand for petroleum in the United States, which utilized a total energy forecast. A forecast was then prepared of crude oil requirements by PAD District, which were allocated to various sources of supply. Thus, the share of the market attributed to Canadian sources of supply was determined by an aggregate analysis, rather than by assessing areas within the Districts and refineries. On this basis, the applicants estimated that exports of Canadian oil to Districts I to IV would increase from 227 thousand barrels per day in 1967 to 926 thousand barrels per day in 1985, assuming the one million barrels per day of United States synthetic production for 1985 estimated by the applicants is marketed in these areas. Corresponding figures for District V were 185 and 300 thousand barrels per day respectively. The applicants' figures did not include additional markets which may accrue by virtue of approval of their

application. Furthermore, the applicants believed that the level of exports they projected may prove conservative, especially in relation to their estimate of the United States supply-demand deficit.

Production from Provinces other than Alberta. The applicants expected production from British Columbia would increase to 1980 and remain virtually constant thereafter. Production from Saskatchewan and Manitoba was anticipated to decline in the 1970's, as additions to reserves were insufficient to offset declining productivity. The Saskatchewan reserve life index was anticipated to fall from some eight years in 1967 to some six years in 1985. Production from Ontario and Norman Wells in the Northwest Territories was projected at constant levels. An allowance was made for production from 'other' areas, commencing at low levels in 1970 and rising to 250 thousand barrels per day by 1980. 'Other' areas were intended to include the Northwest Territories, the Yukon and British Columbia offshore. The applicants expected that potential production from the Arctic Islands, Eastern offshore areas and Quebec would be marketed in Eastern Canadian markets.

Overall, the applicants forecast that production from areas other than Alberta would rise from 332 thousand barrels per day to 466 thousand barrels per day in 1980.

Production of Alberta Crude Oil and Equivalent. On the basis of the projection of demand and supply from areas other than Alberta, production of crude oil and pentanes plus in Alberta was anticipated by the applicants to increase from 712

thousand barrels per day in 1967 to 1,566 thousand barrels per day by 1980.

Production of Alberta Conventional Crude Oil. The applicants' forecast of Alberta conventional crude oil production results from deducting its estimates of synthetic crude oil and pentanes plus production from the projection of crude oil and equivalent production. Synthetic crude oil production was assumed to be 45,000 barrels per day from 1969 onwards; production of pentanes plus increased from 80 thousand barrels per day in 1967 to 106 thousand barrels per day in 1980.

Consequently, the applicants forecast that production of Alberta conventional crude oil would rise from 631 thousand barrels per day in 1967 to 1,415 thousand barrels per day in 1980.

Further details of the applicants' projections are shown in Tables VIII-2, VIII-3, VIII-4 and VIII-5.

(b) Views of Chevron

Chevron did not present a projection of demand for Alberta oil. However, it did include a forecast of exports of Canadian oil to the United States. Exports of crude oil and equivalent to District V were anticipated to fall to a level of 120,000 barrels per day in 1970 from the level of 188,000 barrels per day achieved in 1967, and subsequently to rise to 225,000 barrels per day by 1980. However, Chevron qualified the figures for the later forecast years, since no allowance had been

incorporated for the effect of production from the Arctic slope or Santa Barbara offshore. Chevron believed these developments could suppress any growth in Canadian exports to District V.

With respect to Districts I to IV, Chevron anticipated a steady growth in Canadian exports of crude oil and equivalent from 229,000 barrels per day in 1967 to 730,000 barrels per day in 1980.

In total, Chevron estimated that Canadian exports would grow from 417,000 barrels per day in 1967 to 955,000 barrels per day in 1980.

(c) Views of the Board

Domestic Demand for Canadian Oil. The Board's most recent forecasts indicate that, in total, domestic demand for Canadian oil would grow from 628 thousand barrels per day in 1967 to 1,085 thousand barrels per day in 1980: an average annual growth rate of some 4.3 per cent. This aggregate figure embraces average annual growth rates of 3.2 per cent for the Prairie Provinces and the Northwest Territories, 4.2 per cent for British Columbia and 5.1 per cent for Ontario.

The Board notes that its forecast exceeds the applicants' by close to 100,000 barrels per day in 1975 and by 130,000 barrels per day in 1980. Most of the difference between the projections relates to Ontario. The underlying rate of growth of total product demand for this Province utilized by the Board averaged 4 per cent, 1967 to 1980. The Board also assumed the continuation of the current provisions of the National Oil Policy, and that with

respect to Ontario, the implementation of them would entail the displacement of some 25,000 barrels per day of current imports and transfers of lighter ends over the first five or so years of the forecast period.

The Board agrees with the applicants that the rate of growth of Canadian oil consumption within Canada may decline in the future. However, the Board does not believe that, as anticipated by the applicants, the volumetric average increase over the forecast period will be less than over the past five years. Moreover, the Board considers the growth over the latter period to have been depressed to the extent that deliveries of Canadian oil to Ontario were limited primarily by pipe line capacity. Overall, the Board does not believe its forecast of domestic requirements is excessive.

Export Demand for Canadian Oil. The Board's forecast of exports was based on a general projection of the trends in the growing market for Canadian oil in the United States. In particular, it makes no allowance either for the elimination of restraints on Canadian oil exports or for the impact of the development of large additional requirements for synthetic or conventional crude oil in the United States. The Board envisaged growth in exports of Canadian oil to District V would be severely curtailed by the actual and prospective growth in Alaskan production and the possibility of additional production in California. Thus, export volumes to this area were anticipated to rise only marginally from 145 thousand barrels per day in

1968 to 165 thousand barrels per day in 1980. In contrast, the Board expects a substantial increase in exports to Districts I to IV from a level of 229 thousand barrels per day in 1967 to 800 thousand barrels per day in 1980. The annual growth rate for these areas, initial to terminal year, is 10.1 per cent. The figures include an increase in shipments to District IV of some 100 thousand barrels per day, reflecting the assumption that the recently expanded pipe line capacity for systems supplying Canadian oil to this area would be utilized during the forecast period. In District II allowance was made for increases in requirements of refineries, for instance in Minnesota and Wisconsin, which are dependent on Canadian oil for the majority of their supplies, and for increased penetration of the Detroit-Toledo area and north and central Michigan. Processing of Canadian oil by Chicago refineries was anticipated to commence in 1970 and to increase throughout the period.

Overall, Canadian exports to the United States were anticipated to increase from 416 thousand barrels per day in 1967 to 965 thousand barrels per day in 1980, yielding an average annual growth rate of 6.7 per cent.

A comparison of the forecasts shown in Table VIII-2 indicates a reasonably close correspondence for 1970 and 1975 for District V, in terms of a minimal growth situation for Canadian exports. The 1980 assessment for District V is also similar, given the fact that Chevron believed their forecast might be high. For Districts I to IV, all forecasts are in close agree-

ment in 1970. However, by 1975, the applicants' forecast exceeds Chevron's and the Board's by a considerable volume. This reflects the applicants' anticipated growth of over 300,000 barrels per day, 1975 over 1970. The Board believes this amount may be excessive. In 1980, the 1975 absolute differences between the Board and Chevron forecasts and the applicants' remain much the same.

Table VIII-2

Demand for Canadian Oil
(thousands of barrels per day)

	Domestic Demand		Exports to the United States					
			U.S. Districts I to IV			U.S. District V		
Year	Applicants	Board	Applicants	Chevron	Board	Applicants	Chevron	Board
1967	632	628	227	229	229	185	188	187
1970	685	731	350	340	368	145	120	145
1975	815	907	664	515	549	160	130	153
1980	955	1,085	897	730	800	180	225	165
Average Annual Growth Rate	3.2	4.3	11.2	9.3	10.1			

	Total Exports			Total Demand	
Year	Applicants	Chevron	Board	Applicants	Board
1967	412	417	416	1,044	1,044
1970	495	460	513	1,180	1,244
1975	824	645	702	1,639	1,609
1980	1,077	955	965	2,032	2,050
Average Annual Growth Rate	7.7	6.6	6.7	5.3	5.3

<u>Oil Production from areas other than Alberta</u>. The Board estimated that production from Saskatchewan would decline, mainly over the latter half of the forecast period. This pattern implicitly assumed that declining production from certain existing

reservoirs would not be more than offset by new developments and discoveries. Production from British Columbia was expected to rise gradually, but the small production from other areas such as Manitoba and Ontario was assumed to remain constant. The Board deemed it prudent to include an allowance for production from 'new' areas, which might embrace substantial discoveries from such varied sources as offshore or northern British Columbia, the Northwest Territories and new formations in Saskatchewan. This allowance amounted to some 150 thousand barrels per day in 1980. The 'new' areas allowance makes no provision for discoveries in the Northwest Territories of a magnitude comparable to Prudhoe Bay. If realized, such a development would require a substantial revision to the figures.

Overall, the Board projected production from areas other than Alberta would rise from 332 thousand barrels per day in 1967 to 457 thousand barrels per day in 1980.

The Board's forecast of Saskatchewan production is some 90 thousand barrels per day more than the applicants' by 1980. Although the Board believes the production from several existing reservoirs may exhibit a pattern similar to the applicants' projection, the Board expects that further development and continuing new discoveries will mitigate this trend. The respective forecasts for British Columbia are close. Production from 'new' areas assigned by the applicants exceed those of the Board by 100 thousand barrels per day in 1980. As a consequence of compensating differences within the forecast by 1980 the Board's and the

applicants' projections of total production from areas other than Alberta are in close agreement. However, in 1975, the Board's forecast exceeds the applicants' by over 100 thousand barrels per day, with the discrepancy attributable mainly to the differing forecasts of production from Saskatchewan and 'new' areas.

Table VIII-3

Oil Production from Areas other than Alberta
(thousands of barrels per day)

	Saskatchewan and Manitoba		British Columbia Ontario and N.W.T.(1)		New Areas		Total Production	
	Applicants	Board	Applicants	Board	Applicants	Board	Applicants	Board
1967	269	269	63	63	-	-	332	332
1970	250	266	73	77	5	5	328	348
1975	178	256	84	90	40	75	302	421
1980	129	216	87	91	250	150	466	457

(1) N.W.T. production confined to Norman Wells.

Production of Alberta Crude Oil and Equivalent. On the basis of the forecasts discussed above, production of crude oil and equivalent from Alberta was anticipated by the Board to expand from 713 thousand barrels per day in 1967 to 1,594 thousand barrels per day in 1980. These figures include synthetic crude oil production under the current approval issued to Great Canadian of 45,000 barrels per day, but no additional synthetic supplies.

The difference in any one year between the Board and the applicants' forecasts of demand for Alberta oil is the net effect of any variations between the components of the projection. The principal difference between the forecasts in total appears in 1975, most of which is attributable to the lower level

of production from 'other' areas anticipated by the applicants, rather than to a divergence in estimates of total demand for Canadian oil.

Table VIII-4

Demand for Alberta Oil
(thousands of barrels per day)

Year	Applicants	Board
1967	712	713
1970	852	896
1975	1,337	1,188
1980	1,566	1,594

Production of Alberta Conventional Crude Oil. The applicants' and Board projections of production of conventional crude oil shown in Table VIII-5 are the figures of Table VIII-4 after deduction of estimates of synthetic crude oil and pentanes plus production. As such these numbers include heavy crude oil production which currently amounts to some 26 thousand barrels per day and may increase to some 43 thousand barrels per day by 1980. Both forecasts utilized a synthetic crude oil production level of 45,000 barrels per day from 1969 onwards. However, the applicants' estimates of pentanes plus production were lower than those of the Board in each year, with the difference amounting to some 50 thousand barrels per day in 1975 and 1980. Consequently, the variation between the forecasts in 1975 shown in Table VIII-4 is accentuated when restricted to conventional oil production; the corresponding difference in 1980 is reversed.

Table VIII-5

Demand for Alberta Conventional Crude Oil
(thousands of barrels per day)

Year	Applicants	Board
1967	631	631
1970	709	728
1975	1,191	989
1980	1,415	1,389

IX HEAVY FUEL OIL MARKETS

(a) Views of the Applicants

The applicants proposed to manufacture a product closely related in characteristics to a No. 4 fuel oil. However, it was anticipated that this product would effectively compete in the market for No. 6 fuel oil[1]. The applicants anticipated that the specifications of their proposed fuel oil would have particular advantages, including low sulphur content - an important aspect in the light of increasing interest in pollution controls - a low metal content and a low pour point.

Ontario and British Columbia. The applicants presented evidence to demonstrate an anticipated increasing gap between the supply and demand for certain fuel oils in Ontario and British Columbia which they expected would be supplied by imports or transfers from areas east of the National Oil Policy 'line' under normal circumstances. Details of the evidence are shown in Table IX-1.

---

(1) The Dominion Bureau of Statistics defines Heavy Fuel Oil as all grades of residual type fuels, embracing Numbers 4, 5 and 6 fuel oil. The uses of these fuels are primarily industrial, including blast furnaces, ships, locomotives, power generation and refineries.

Table IX-1

Fuel Oil Deficiency to be Supplied by Imports and Transfers
(MB/D)

Year	Ontario: Maximum Production Maximum Demand	Ontario: Minimum Production Minimum Demand	British Columbia: Maximum Demand	British Columbia: Minimum Demand
1967	24	24	16	16
1970	37	35	18	17
1975	54	44	16	13
1980	70	54	22	18

In Ontario, heavy fuel oils compete in the market with natural gas, coal, electricity and nuclear power generation. The applicants postulated two cases for Ontario demand, which related to differences in the proportion of the market served by natural gas. Two cases were also shown for domestic production of Ontario heavy fuel oils, both of which indicated relatively insignificant increases in production. This latter trend was intended to accommodate an anticipated reduction in the availability of medium gravity oil for Ontario refineries, particularly from Saskatchewan, and the continuing economic incentives for refiners to minimize the yield of residual fuel oil. The applicants contended that these incentives were related to ratios of product yield to market demand and the fact that the realization from heavy fuel oil was less than the price of Canadian conventional oil. On this basis, the difference between supply and demand to be supplied by imports and transfers was estimated to range from 24 thousand barrels per day in 1967 to 54 thousand and 70 thousand barrels per day in the minimum and maximum cases, respectively, in 1980. In 1975, the gap was

expected to vary from 44 thousand barrels per day to 54 thousand barrels per day, of which some 10 thousand barrels per day was estimated to reside in the Ottawa Valley. Thus, under the current National Oil Policy, the indicated market for imports and transfers which might be displaced by Canadian sources of supply would vary between 34 thousand and 44 thousand barrels per day in 1975.

A similar analysis was conducted for the British Columbia residual fuel oil market. Domestic production was anticipated to increase from 12 thousand barrels per day in 1967 to 19 thousand barrels per day in 1980. Two cases were projected for total demand, with the lower case assuming that gas would be supplied to Vancouver Island. These projections indicated a supply-demand gap varying from 18 thousand barrels per day to 22 thousand barrels per day in 1980. The figures supplied by the applicant for both Ontario and British Columbia related primarily to No. 6 fuel oil.

Great Lakes Area of the United States. Cities undertook a survey of markets for low sulphur fuel oil in the Great Lakes area. The survey indicated an existing and potential strong demand for low sulphur fuel oil not currently being met. Consumers of fuel oil were using higher sulphur specification product than preferable; coal and natural gas were used in industrial applications which could be supplied by appropriate fuel oils.

In the States of Illinois, Indiana, Michigan and Wisconsin consumption of residual oil exceeded production from surrounding areas to the extent that the region imported a portion of its required residual fuel supplies from other areas of the United States. Production of residual fuel oil had declined significantly over the past five to six years at a time when the demand for energy increased. This indicated an increasing demand for fuel oil was not being met from conventional sources.

Cities anticipated that production of residual fuel oil by refineries would continue to decline, particularly in view of the costs involved in the reduction of sulphur content and that competitive fuels would supply the increasing energy demand, even more so than in the past.

Atlantic Richfield endorsed the conclusions of Cities' study.

(b) Views of the Board

Markets in Ontario and British Columbia. Under the current terms and operation of the National Oil Policy, movements of certain heavy oils are exempt from the normal provisions of the Policy. In particular, imports or transfers from areas east of Ontario supply any deficiency between domestic production and fuel oil requirements in Ontario and British Columbia.

With respect to the future operation of the National Oil Policy, the Board can see no reason to assume at this time that the factors which have provided justification for the exemption of heavy fuel oils from the normal operation of the Policy will change significantly in the future. Thus, the Board anticipates

that offshore supplies will be available and that economic incentives and the market structure will continue to encourage refiners in Ontario and British Columbia to maintain or increase the yield of the lighter products. Consequently, the Board believes that the supply-demand gap at whatever level realized will continue to be satisfied by imports and transfers.

Table IX-2 shows the historical production of heavy fuel oil, defined as the DBS classification 4, 5 and 6, as a proportion of refinery runs, the demand for heavy fuel oils and the volume of imports and transfers for Ontario and British Columbia.

Table IX-2

Demand & Supply of Residual Fuel Oil

Ontario
(MB/D)

Year	Demand for Heavy Fuel Oils	Production of Heavy Fuel Oils (1)	Production as % of Refinery Runs (2)	Imports and Transfers
1957	36	26	15	10
1960	42	29	13	13
1962	53	42	18	11
1964	65	47	16	18
1965	76	54	17	22
1966	78	56	19	22
1967	82	61	19	21

British Columbia
(MB/D)

Year	Demand for Heavy Fuel Oils	Production of Heavy Fuel Oils (1)	Production as % of Refinery Runs (2)	Imports and Transfers
1957	21	11	18	10
1960	18	9	13	9
1962	18	10	13	8
1964	21	11	13	10
1965	22	10	12	12
1966	25	12	13	13
1967	29	13	12	16

(1) Includes inventory changes

(2) Net of inventory changes

Source: Dominion Bureau of Statistics

The Board has not undertaken an independent, detailed forecast of the markets for heavy oils in Ontario and British Columbia but rather has appraised the evidence supplied by the applicants. In the case of British Columbia, the Board is in close agreement with the applicants' estimates of both domestic supply and demand. Hence, the Board believes that a supply-demand gap anticipated by the applicants in the range of 13 to 16 thousand barrels per day in 1975, increasing to 18 to 22 thousand barrels per day in 1980 is reasonable. With respect to Ontario, the Board sees no justification for diverging from the applicants' forecast of demand. However, the Board considers that the applicants' forecast of production may be conservative. This view primarily reflects the Board's anticipation that refinery throughputs in Ontario will be somewhat higher than those expected by the applicants. The Board's appraisal indicated that the supply-demand gap on the basis of its own forecast of refinery throughput, and assuming a gradual reduction in residual fuel oil yield, would be some 40 thousand barrels per day in 1975 and 55 thousand barrels in 1980. This corresponds to the applicants' figures of 44 to 54 thousand barrels per day and 54 to 70 thousand barrels per day, respectively.

Great Lakes Area of the United States. As in the case of Ontario and British Columbia, the Board has not conducted an independent, detailed study of fuel oil markets in the Great Lakes area. However, the Board has prepared some data relating to the six States of Michigan, Wisconsin, Illinois, Ohio,

Minnesota and Indiana, which indicate that the consumption of residual fuel oil in this area has fallen from a peak of 214 thousand barrels per day in 1956 to a level of 154 thousand barrels per day in 1966. In terms of refinery yield, residual fuel oil has fallen from some 15 per cent in the early 1950's to some 7 per cent in 1967. The details are shown in Table IX-3.

Table IX-3

Residual Fuel Oil Movements, Great Lakes Area

(MB/D)

Year	Consumption of Residual Fuel Oil in Six States(1)	Residual Fuel Oil Production as Proportion of Refinery Runs %(2)
1950	192	15.3
1956	214	12.1
1961	181	10.4
1964	165	8.5
1965	167	8.2
1966	154	6.8
1967	N.A.	6.8

(1) Minnesota, Wisconsin, Michigan, Indiana, Illinois and Ohio

(2) Six States and Kentucky, Tennessee, North Dakota and South Dakota.

Source: U.S. Bureau of Mines

The Board presumes that apart from the incentives towards maximization of yields of higher value products which exist for United States refiners, the trend shown by these figures also reflects competition from other energy sources, such as natural gas. This background indicates to the Board that the essential conclusion of the Cities' study - the existence of an actual or potential market for residual fuel oil of appropriate quality

in the Great Lakes area - is valid. The Board also notes that some 25 thousand barrels per day net of residual fuel oil is imported into District II, most of which is supplied from domestic refinery sources.

A further aspect in the evaluation of the market for fuel oils in the Great Lakes area is the position of residual fuel oil under the United States Oil Import Program. Currently, residual fuel oil imports into the East Coast of the United States are regulated only to the extent that the amounts licensed satisfy the anticipated supply-demand gap. This indicates to the Board that prima facie the treatment of residual fuel imports into the Great Lakes area similarly would be excluded from the overall 12.2 per cent of domestic production import quota for Districts I to IV. Moreover, the Board believes that whether or not such fuel oil imports are treated within the 12.2 per cent quota, these amounts will not be subject to informal restraints.

X THE UNITED STATES SUPPLY-DEMAND BALANCE

The Board received evidence in the form of written submissions and testimony at the hearing regarding the ability of United States domestic sources to supply future United States requirements for liquid hydrocarbons. The Board considers that such evidence provides a cross section of knowledgeable opinions concerning the performance of the factors relevant to future United States supply and demand. In view of the fact that there is considerable variation among these opinions, the Board believes that its views should embrace a range of possibilities reflecting these differences.

(1) Views of the Applicants

The applicants submitted an estimated United States supply-demand balance based on the elements contained in Table X-1 below.

Table X-1

Applicants: United States Supply-Demand Balance for Total Liquid Hydrocarbons
(thousands of barrels per day)

	U.S. Demand (1)	U.S. Conventional Domestic Supply (2)	U.S. Synthetic Production (3)	Deficiency (4)
1967	12,583	10,222	-	2,361
1970	13,460	10,600	-	2,860
1975	15,344	11,515	100	3,729
1980	17,212	11,637	500	5,075
1985	18,832	11,605	1,000	6,227

The figures shown in column (1) above include exports from the United States. The deficiency shown in column (4) of the table is the difference between column (1) and the sum of columns (2) and (3). This deficiency differs from that presented on page VI-2 of the applicants' submission due to the inclusion of the applicants'

forecast of synthetic production. In addition, it should be noted that the deficiency shown for 1967 understates the volume of imports into the United States in that year by 175 thousand barrels per day, or some 7 per cent. This reflects the exclusion from column (1) of inventory changes, which were both positive and substantial in 1967.

United States Oil Demand. The applicants' forecast of United States demand was based primarily on the application of judgment to historical trends. The average annual rate of growth in the forecast from 1967 to 1985 is 2.3 per cent. This growth rate is substantially lower than the 4.9 and 4.4 per cent achieved in 1966 and 1967, respectively.

The applicants commented on the fact that their demand forecast was low in relation to forecasts prepared by the United States Department of the Interior. In particular, the applicants noted that their own forecast for 1980 was 17.2 million barrels per day, whereas the United States Department of the Interior in a contemporaneous forecast had estimated 1980 demand at 17.5 million barrels per day and subsequently increased its estimate to 18.2 million barrels per day. The applicants expressed confidence in the demand forecasts of United States government departments and believed their own forecast would prove conservative both for this reason and because the estimate for average daily demand in 1970 in their own forecast was actually achieved during the first part of 1968.

United States Conventional Oil Supply. In order to determine future United States production from conventional sources, consideration was given to prior performance of the United States producing industry and policy objectives which the applicants believed would be espoused by future United States governments. As regards the latter, the applicants were of the opinion that the government would seek to maintain the producing life index at desirable levels.

The predictions with respect to future levels of United States conventional reserves of liquid hydrocarbons resulted from an analysis of appreciation factors, well ststistics and historical trends in exploratory drilling in the various United States areas of production. The applicants indicated that, in aggregate, reserve additions accredited to the initial year discovery, and adjusted to compensate for partially developed fields, have averaged about 3.5 billion barrels annually since 1957. During this period the life index of proved reserves declined steadily, reaching a level of 10.7 years at the end of 1967. On the basis of their study, the applicants concluded that average annual reserve additions over the forecast period would remain virtually unchanged from the level of the previous decade.

The applicants related the rate at which future United States conventional reserves would be produced to the concept of national security. It was contended that, as a matter of prudence, future United States governments would retain surplus producing capability

sufficient to cover a significant portion of imports of overseas crude oil and products. The applicants believed that United States security objectives would be satisfied provided conventional producers were able to replace some 50 to 75 per cent of overseas imports in the event of future emergencies. In this connection, allusion was made to similar views expressed by Dr. R. J. Gonzalez, an American consulting petroleum economist, in the Oil and Gas Journal, April 15, 1968. The 50 to 75 per cent requirement was related to volumes of overseas imports representing some 16 per cent of predicted United States demand. Witnesses for the applicants stated that the production forecast in column (2) of Table X-1 was derived by allowing the life index of United States reserves to decline to 9 years in 1974, at which level it was held constant thereafter, a procedure which the applicants claimed would provide the requisite surplus capability. On these assumptions, United States conventional production reaches a plateau in the latter half of the 1970's and subsequently declines.

At the hearing, Mr. R. G. Daniel was questioned on the realism of projecting gross additions to reserves at the level of recent history. Mr. Daniel acknowledged that the United States Department of the Interior's publication, 'United States Petroleum through 1980', mentioned future reserve additions of 4.8 billion barrels annually. However, Mr. Daniel quoted from the text of the latter document to show that the figure of 4.8 billion barrels was not intended to represent a forecast of future reserve additions, but was simply a prerequisite for the attain-

ment of production levels necessary to maintain the United States deficiency at a desirable level. Mr. Daniel also rejected the possibility that a long term rate of reserve additions greater than the historical rate would ensue as a result of the two recent discoveries in the Prudhoe Bay area of Alaska. The reserves associated with these discoveries have been estimated at between 5 and 10 billion barrels by DeGolyer and MacNaughton, a United States firm of petroleum consultants. Mr. Daniel agreed that the upper limit of the range represented annual reserve additions of some 1.5 billion barrels per year over 7 years and was therefore approximately equivalent over this length of time to the difference between historical annual reserve additions and the figure of 4.8 billion barrels per year mentioned by the Department of the Interior in 'United States Petroleum through 1980'. However, the witness opined that discoveries of this magnitude were necessary simply to maintain reserve additions at the historical level, since the principal effect would be to offset downward trends in other areas. Moreover, Mr. Daniel believed that within Alaska itself the production estimates embodied in the applicants' forecast would not be exceeded as a result of recent discoveries in the Prudhoe Bay area, since the original estimates were based on an evaluation of Cook Inlet which now appeared overly optimistic. The applicants' forecast of Alaskan production is shown in Table X-2 following.

Table X-2

Applicants: Forecast of Alaska Production
(thousands of barrels per day)

1967	1970	1975	1980	1985
80	310	410	880	1,250

With respect to other states, the applicants predicted increases in production from Louisiana offshore and California. Increases in Texas production were expected to be small.

United States Synthetic Oil Supply. The applicants predicted that production from such sources as oil shale and coal liquefaction would commence at 100 thousand barrels per day in 1975 and increase to 500 thousand barrels per day and 1 million barrels per day by 1980 and 1885, respectively. The expected location of this production was not specified. Testimony given at the hearing emphasized that production of this nature is dependent on the development of an adequate technology and the provision of large amounts of capital, both of which factors underline the uncertainty of the forecast. However, the applicants viewed the history of such projects as favourable to future commercial development. In support of this view, the applicants referred to a publication of the United States Department of the Interior entitled 'Prospects for Oil Shale Development', in which a plant producing 35 thousand barrels per day in 1972 was deemed a realistic possibility. This was held to be consistent with the opinion expressed by the United States Department of the Interior in 'United States Petroleum through 1980' to the effect that synthetic production was unlikely to constitute an appreciable factor in the United States

energy market before 1980. The applicants contended that their 1980 projection of 500 thousand barrels per day United States synthetic production was not significant in relation to a projected level of United States demand of 17.2 million barrels per day.

Deficiency of United States Oil Supply. Various aspects of the deficiency resulting from the applicants' analysis are depicted in Table X-3.

Table X-3

Applicants: Deficiency of United States Total Liquid Hydrocarbon Supply (thousands of barrels per day)

	Deficiency (1)	Overseas Imports at 16% U.S. Demand (2)	Required Overland Imports (3)
1970	2,860	2,154	706
1975	3,729	2,455	1,274
1980	5,075	2,754	2,321
1985	6,227	3,013	3,214

The applicants believed the deficiency shown in column (1) to be a reliable, but possibly conservative, estimate. This view was based on the opinion that the underlying production forecast would prove accurate, whereas the forecast of United States demand might be exceeded. Representatives of the companies affiliated with the applicants and involved in purchasing agreements regarding the synthetic production also expressed confidence in the deficiency forecast.

The numbers in column (2) were obtained by relating the applicants' assumption that the United States authorities would seek to maintain overseas imports at 16 per cent of United States demand to the demand projection in Table X-1. The applicants

emphasized the fact that overseas imports had averaged 16 per cent of demand since mandatory government controls were imposed, indicating that the United States government considered this to be a desirable level. Witnesses disagreed with the suggestion that the historical relationship between overseas imports and United States demand was a partially fortuitous outcome of the present United States Oil Import Program. In this regard, the applicants stressed the cohesion of all the elements embodied in their analysis of future United States supply deficiency and contended that, if overseas imports should actually exceed 16 per cent of United States demand, the United States would be forced to maintain the life index of reserves at a level higher than 9 years in order to be able to replace 50 to 75 per cent of such imports. Thus, in the applicants' judgment, an increase in the level of overseas imports above 16 per cent of United States demand would inflate the deficiency in Table X-3 by reason of a reduction in the level of United States conventional production shown in Table X-1.

The numbers in column (3) of Table X-3 were not provided by the applicants and are simply the residual obtained by deducting the numbers in column (2) from the deficiency in column (1).

(2) Views of Chevron

Chevron submitted detailed evidence regarding both national and regional aggregates of future United States supply and demand. Table X-4 summarizes Chevron's predictions with respect to United States totals.

Table X-4

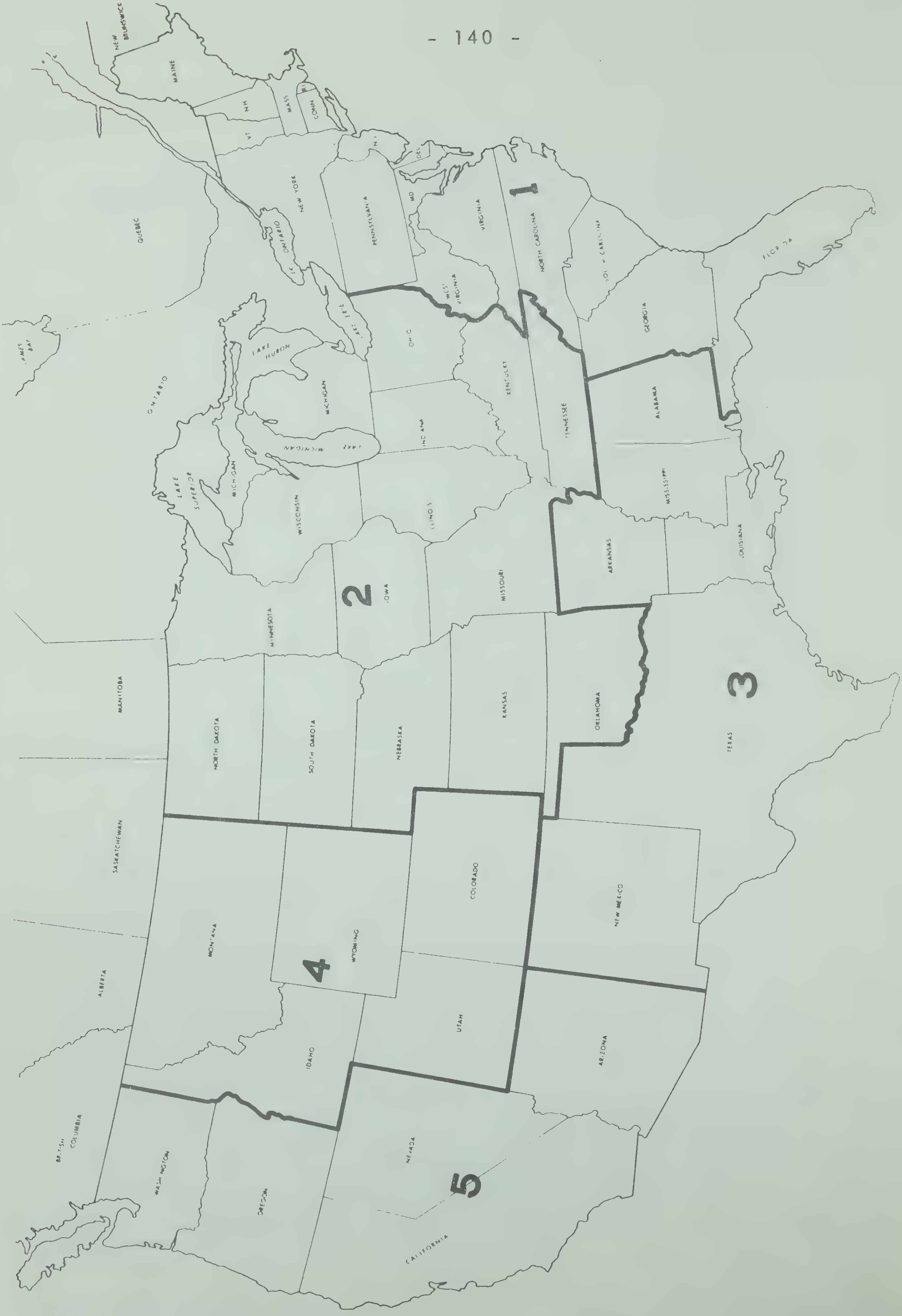
Chevron: United States Supply-Demand Balance for Liquid Hydrocarbons
(thousands of barrels per day)

Year	U.S. Demand	U.S. Conventional Domestic Supply	U.S. Synthetic Production	Deficiency
1967	12,300	10,222	-	2,078
1970	13,600	10,941	-	2,659
1975	15,500	12,055	-	3,445
1980	17,600	12,695	100	4,805

The figures shown for the deficiency were not directly provided by Chevron and are simply the difference between Chevron's demand and supply forecasts. The term of Chevron's forecast did not extend beyond 1980. It is to be noted that the 1967 number for United States demand in Table X-4 is some 300 thousand barrels per day less than in the applicants' tabulation. This difference is attributable to the fact that Chevron's presentation of national demand totals did not include exports from the United States.

United States Oil Demand. Chevron believed the proportionate growth in demand during the first half of the 1960's would not be sustained over the forecast period, in view of competing pressures in the United States energy market. Strong growth was foreseen in markets for motor and aviation fuels, whereas markets for other petroleum products were anticipated to be subject to incursions by natural gas and nuclear power. On the basis of these factors, Chevron predicted an average annual growth rate for United States demand of some 2.8 per cent between 1967 and 1980. The resultant levels of demand for individual years are somewhat higher than in the applicants' forecast despite the fact that Chevron's demand numbers did not include exports from the United States.

UNITED STATES P.A.D. DISTRICTS



Chevron also provided separate estimates of demand relating to the areas comprising the United States Petroleum Administration for Defence Districts I to IV and District V[1], the boundaries of which are shown on the map on page 140. The estimates for these regions are prescribed in Table X-5.

Table X-5

Chevron: United States Demand for Liquid Hydrocarbons by Districts
(thousands of barrels per day)

Year	Districts I - IV	District V	Total
1967	10,921	1,837	12,758
1970	11,880	1,999	13,879
1975	13,515	2,365	15,880
1980	15,225	2,835	18,060

The sum of the District demand numbers exceeds the United States total demand shown in Table X-4 by amounts ranging from some 300 to 450 thousand barrels per day. This difference reflects the inclusion in the District numbers of exports from the United States and bonded oil imports, both of which are excluded from the United States demand totals in Table X-4. According to Chevron's demand projections, the average annual rate of growth over the forecast period is some 2.6 per cent in Districts I to IV, and some 3.4 per cent in District V.

United States Conventional Oil Supply. Over the period of the forecast, Chevron predicted a more vigorous expansion than the applicants in United States conventional production. Thus, Chevron's estimate for United States production in 1980 exceeds

(1) District V includes Alaska.

the applicants' by some 1.0 million barrels per day. In substantiating its views, Chevron referred to trends in both United States reserve additions and productive capacity. It contended that an extrapolation of reserve additions at the average rate over the last decade was pessimistic, since advances in technology could be expected to improve the performance of future discoveries. Chevron also maintained that the United States industry had demonstrated its confidence in future prospects by the high level of recent bids for off-shore California, Texas and Louisiana acreage. However, Chevron stressed the inadequacy of a purely reserve-oriented approach in assessing production capabilities. It believed the life index based on proved reserves was unduly restrictive in this type of evaluation. In addition, it claimed that numerical values of life indices signified little unless they were related to other characteristics of producing reservoirs. For these reasons, Chevron assigned considerable weight to trends in productive capacity in preparing its forecast of United States production. It noted that, over the last decade, United States productive capacity had grown at a substantially higher rate than proved reserves. It also observed that Independent Petroleum Institute of America's estimate of crude oil productive capacity, excluding natural gas liquids, exceeded crude oil production by some 2.4 million barrels per day at the end of 1967, and noted that the corresponding estimates prepared by the National Petroleum Council and the American Petroleum Institute exceeded 1967 crude oil production by some 3.5 million barrels per day.

Chevron foresaw progressively higher utilization of capacity in presently developed areas, and believed that full utilization of United States productive capacity would be closely approached by 1980.

Chevron also provided estimates regarding the amounts of future United States production located in Districts I to IV and the major producing states of District V. These are summarized in Table X-6 below.

Table X-6

Chevron: Location of Future United States Conventional Production (thousands of barrels per day)

Year	District V: Crude Production California	District V: Crude Production Alaska	District V: N.G.L. Production	District V: Total	Districts I-IV: Crude Production	Districts I-IV: N.G.L. Production	Districts I-IV: Total
1967	995	80	64	1,139	7,737	1,346	9,083
1970	1,050	260	65	1,375	8,066	1,500	9,566
1975	1,150	450	75	1,675	8,630	1,750	10,380
1980	1,000	450	75	1,525	9,260	1,910	11,170

With respect to District V, Table X-6 shows an increase in total production up to 1975, and a decline in the subsequent five-year period. The reduction in total during the latter period reflects static Alaska crude oil production and declines in both natural gas liquids production and California crude oil production. Regarding Alaska, Chevron stated that it had included in the projection for 1975 and 1980 an allowance of some 200 thousand barrels per day for production from the Prudhoe Bay area. The latter number was determined solely on the basis of the minimum economic throughput of a pipe line extending from the Arctic Slope to tidewater. Chevron believed there was a reasonable likelihood that its projection of Arctic Slope production would be exceeded in view

of DeGolyer and MacNaughton's recent evaluation of the two discoveries in the Prudhoe Bay area. Hence, Chevron inclined to the view that its forecast of Alaska production was conservative. Chevron also drew attention to the absence in its projection of any provision relating to large scale California offshore reserve additions. This factor was believed to reinforce the conservative nature of the District V forecast in the period 1975 to 1980.

In regard to Districts I to IV, Chevron predicted a continual increase in production over the term of the forecast. The average annual increase in each interval is some 1.6 per cent for the period as a whole. Chevron made no detailed comment on the projection for Districts I to IV, other than to express its belief that spare capacity in Texas and Louisiana would be virtually eliminated by 1980.

<u>United States Synthetic Oil Supply</u>. Chevron foresaw the commencement of United States synthetic production at a level of 100 thousand barrels per day in 1980. It believed that such production would be located in Districts I to IV, although the type of production process remained unspecified. In support of its position regarding the timing and magnitude of United States synthetic production, Chevron quoted the following views on the future significance of synthetic oils expressed by J. Cordell Moore, United States Assistant Secretary of Mineral Resources, in July, 1968:

> "Regardless of the great advantages that synthetic fuels developed from domestic resources will eventually have to offer in terms of abundance and security, the

fact remains that they cannot offer these things now. Moreover, it is going to be several more years before they become significant in any meaningful way in the energy market. I realize that the term 'significant' means different things to different people. To even the largest company in the petroleum industry, the production of a half-million barrels of products a day from coal or oil shale is significant, and well worth pursuing if the economics are favorable. But a half-million barrels a day is less than 3 per cent of our 1980 total projected demand. So from a national point of view we have to regard synthetic fuels as something to look for in the post-1980 period under anything approaching the normal pace of development which we currently can expect. Should circumstances require, of course, we could greatly accelerate this time-table, but the cost would be high, as it usually is when we seek to buy time."

Deficiency of United States Supply. Various aspects of the deficiency resulting from Chevron's analysis are shown in Table X-7 following.

Table X-7

Chevron: Deficiency of United States Oil Supply
(thousands of barrels per day)

Year	Deficiency (1)	Overseas Imports of Fuel Oil (2)	Other Overseas & Mexican Imports (3)	Canadian Imports (4)	Total Imports (5)
1970	2,659	1,255	1,173	510	2,938
1975	3,445	1,530	1,575	720	3,825
1980	4,805	1,690	2,495	1,080	5,265

The United States demand and production numbers in Table X-4 were used to compute the deficiency shown in column (1) above. Accordingly column (1) does not include the effect of exports from the United States. The total volume of imports in column (5) of Table X-7 relates to the levels of District demand shown in Table X-5 and therefore includes the effects of exports from the United States and bonded oil imports. Hence, the difference between the deficiency and the total volume of imports is wholly attributable to the underlying definitions of demand.

The breakdown between various sources of imports shown in columns (2) to (4) of Table X-7 was determined by Chevron on the basis of competitive advantage and the accessibility of markets. Overseas imports of fuel oil have been identified separately in column (2) of Table X-7, since virtually all such imports enter District I, where they are exempt from the restrictions applying to other imported oils under the terms of the existing United States Oil Import Program. Column (3) concerns imports of overseas oil other than fuel oil and also includes overland imports from Mexico. Column (4) depicts projected levels of Canadian imports.

Table X-8 shows Chevron's estimates of the deficiencies, and associated volumes of imports, in Districts I to IV and District V.

Table X-8

Chevron: Deficiency of United States Supply by District
(thousands of barrels per day)

	Districts I - IV				District V			
Year	Deficiency	Overseas & Mexican Imports	Canadian Imports	Net Transfers to District V	Deficiency	Overseas Imports	Canadian Imports	Net Transfers from Districts I-IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1970	2,314	2,113	380	179	624	315	130	179
1975	3,135	2,715	580	160	690	390	140	160
1980	3,955	3,345	830	220	1,310	840	250	220

The deficiencies in columns (1) and (5) measure the physical need to supplement domestic supply in Districts I to IV and District V, respectively. However, Chevron presumed there would be a net outflow of production from Districts I to IV to District V throughout the forecast period. Hence, the volume of imports is greater than the deficiency in Districts I to IV, and correspondingly less in District V.

Chevron emphasized that the relative shares of overseas and Canadian imports were dependent on developments within specific markets. With respect to Districts I to IV, Chevron anticipated that the majority of overseas imports would continue to be located in District I and remain virtually unaffected by expansions in the United States pipe line system. By contrast, Chevron believed future markets for Canadian imports in District II would reflect the impact of new extensions to the United States pipe line net-

work serving the Great Lakes area, as well as the stimulus of Interprovincial's Chicago lateral. In District V, Chevron predicted that the rapid increases in the deficiency between 1975 and 1980 would induce a relatively modest increase in Canadian imports compared to the expansion in overseas imports. Chevron based this view on the historical response of Canadian and overseas imports to reductions in District V production.

(3) Views of Other Interveners

Mobil predicted that United States production would peak in the mid to late 1970's, precipitating sharp increases in the domestic deficiency. Mobil also presented estimates of combined Canadian and offshore crude oil imports for Districts I to IV of 1,130 and 2,034 thousand barrels per day for 1973 and 1978, respectively. These numbers only partially reflect the total United States domestic deficiency, since they apparently exclude imports of residual fuel oil and overland imports from Mexico, as well as certain other categories of imports.

Evidence introduced at the hearing included a chart forecasting North American supply and demand, the source of which was an address given in April, 1966 by Mr. F. H. Moore, the then President of Mobil. The witness for Mobil agreed that the deficiency predicted by Mr. Moore approximated that forecast by the applicants. However, no attempt was made to relate the North American aggregate supply-demand numbers shown on this chart to the United States deficiency.

IPAC believed the present to be a hazardous time to estimate future United States reserve additions. In support of this view it cited the enormous Alaskan reserves indicated by discoveries in the Prudhoe Bay area and the large reserves potential of the Mackenzie Valley and Delta. IPAC also reasoned that the recent measures announced by the President of the United States regarding the curtailment of overseas investments, would probably divert additional industry capital to domestic exploration.

Dome agreed with IPAC's opinion that recent discoveries on Alaska's coastal plain would stimulate exploration which could result in very substantial United States reserve additions.

(4) Views of the Board

The Board has compared the deficiencies of United States domestic supply associated with the applicants' and Chevron's numbers and concludes that they are broadly similar. The Board considers this result to be largely fortuitous in view of the different opinions expressed by the applicants and Chevron regarding future developments in United States demand and domestic supply. The demand estimates originally submitted by the applicants are low in relation to Chevron's demand forecast, but the extent of the difference was reduced as a result of further evidence given by the applicants at the hearing. More significant differences relate to United States conventional production, which the applicants assessed less favourably than Chevron, and United States synthetic production, the prospects for which were evaluated more favourably by the applicants. A comparison between the

views of the applicants and other interveners also reveals important areas of disagreement, principally with reference to the impact of recent discoveries in the Prudhoe Bay area of Alaska. The Board believes that such differences of opinion must necessarily be reflected in a consideration of future United States dependence on external sources of supply. Accordingly, the Board has considered a range of estimates embracing alternative assumptions regarding the future United States supply-demand balance. The Board's assessment of these matters does not extend beyond 1980.

United States Oil Demand. Aside from the applicant, only Chevron provided detailed evidence concerning future United States oil demand. The other interveners either expressed no views on this subject or else concurred in general terms with the applicants' views. The applicants' projection was made on a national basis, and included exports from the United States but excluded bonded oil imports. By contrast, Chevron presented one set of numbers relating to total United States demand, which did not include either exports from the United States or bonded oil imports, and a second set relating to District demand, in which both the latter components were included. The different bases on which the projections were prepared has necessitated the selection of a common definition of demand.

For purposes of assessing the future deficiency of United States oil supply, the Board considers it necessary to include the demand associated with exports from the United States.(2)

(2) Exports of liquid hydrocarbons from the United States in 1967 totalled some 300 thousand barrels per day and were inflated as a consequence of the Arab-Israeli war. Exports from the United States in 1966 totalled some 200 thousand barrels per day.

The Board bases this view on the belief that exports from the United States will continue in the future because they currently form an integral part of international supply arrangements. The Board recognizes that the demand satisfied by bonded oil imports is also external in origin and similar in this respect to the demand relating to exports from the United States. However, the very fact that such imports are bonded indicates the existence of a market which is essentially different from the ones served by domestic oil and other categories of imports. The Board therefore believes that imports of bonded oil should be excluded from demand projections which are intended to measure the adequacy of United States domestic supply.

Table X-9 following compares the applicants' estimate of United States demand with Chevron's projected demand by District. On the basis of its own estimates, the Board has adjusted Chevron's demand numbers to exclude bonded oil imports.

Table X-9

United States Demand for Total Liquid Hydrocarbons
Including Exports from the United States
(thousands of barrels per day)

	Applicants	Chevron		
	Total	Districts I-IV	District V	Total
1970	13,460	11,850	1,950	13,800
1975	15,344	13,420	2,280	15,700
1980	17,212	15,070	2,730	17,800

The Board believes that the presentation of demand numbers on a regional basis is desirable, since the existing United States oil import program is formulated differently for District I to IV and District V. The total United States demand corresponding to

Chevron's District numbers exceeds the applicants' estimate of United States demand by an amount increasing from 240 thousand barrels per day in 1970 to some 600 thousand barrels per day in 1980. The Board notes that the applicants believed their own demand forecast might prove conservative. In this conclusion, the applicants drew attention to the fact that the level of average daily demand contained in their own forecast for 1970 was actually achieved during the first part of 1968. The applicants also appear to have entertained the possibility of a substantial downward bias in their demand estimates by 1980, since witnesses for the applicants referred on several occasions to two forecasts prepared by the United States Department of the Interior in which 1980 demand was estimated at 17.5 and 18.2 million barrels per day, respectively. In these circumstances, the Board concludes that Chevron's adjusted demand forecast corresponds to the substance of the views expressed by the applicants and is a reasonable projection at the present time. Accordingly, the Board has adopted Chevron's adjusted estimates for the purpose of computing the future deficiency of United States domestic supply.

<u>United States Conventional Oil Supply</u>. Major differences of opinion existed between the applicants and the interveners regarding the future development of United States domestic supply. The information provided by interveners other than Chevron was primarily of a qualitative nature and concerned specific aspects of the applicants' forecast, foremost among which was the realism of projecting annual reserve additions at some 3.5 billion barrels

in the light of the recent discoveries in the Prudhoe Bay area. By contrast, Chevron presented a quantitative assessment of future United States domestic supply and commented on the applicants' projection within this context.

The methods of forecasting described by the applicants and Chevron exhibited two fundamental differences. Firstly, the applicants related production capabilities to reserves, whereas Chevron stressed the importance of productive capacity itself. Secondly, the applicants claimed that their forecast of production presupposed a certain level of overseas imports, while Chevron assessed production independently of such an assumption. Accordingly, the Board has attempted to evaluate the extent to which the two forecasts are influenced by differences in the underlying approaches. The Board has encountered several difficulties in this appraisal.

The applicants testified to the effect that they had projected United States production on the basis of average annual reserve additions of some 3.5 billion barrels and the stabilization of the United States life index at a level of 9 years between 1974 and 1980. The Board has interpolated the applicants' production estimates over each of the intervals of the forecast and finds that the life index associated with the assumption of average annual reserve additions of 3.5 billion barrels actually declines to a level of some 7.5 years by 1980. The Board is therefore unable to determine whether the applicants intended their production forecast to reflect this lower level of the life index in

1980, or a life index of 9 years which would require reserve additions greater than 3.5 billion barrels annually. In these circumstances, the Board has made no attempt to verify the applicants' statement that their production forecast would provide sufficient surplus capability to replace 50 to 75 per cent of overseas imports at 16 per cent of United States demand.

Chevron anticipated that average annual gross additions to United States proved reserves over the forecast period would exceed recent historical rates and that production would approach capacity levels by 1980. Chevron provided no detailed evidence regarding the factors involved in its production forecast and thus the Board has been unable to proceed further in an evaluation of the underlying approach.

The Board believes that considerable uncertainty surrounds the outlook for United States conventional production over the forecast period. To a considerable extent, this uncertainty relates to the potential of new horizons in existing areas of production, and to the eventual magnitude of United States offshore reserves. Moreover, an even higher degree of uncertainty appears to surround the potential reserves associated with recent discoveries in the Prudhoe Bay area of Alaska. Accordingly, the Board has considered the variations between the applicants' and Chevron's production numbers and applied adjustments which it believes appropriate in order to embrace the range of possibilities facing the United States industry.

For reasons already mentioned in connection with United States demand estimates, the Board regards it as desirable to identify the location of future production by District.

Districts I to IV

The production forecast provided by the applicants contained only one regional estimate, that relating to Alaska. Hence, in order to allocate the applicants' total United States production between Districts I to IV and District V a prior assessment is required for California production. The Board believes that Chevron's California production forecast may be used for the purpose of allocating the applicants' United States production numbers to the areas east and west of the Rockies, since both the applicants and Chevron expressed somewhat similar views regarding an allowance for California. Accordingly, the Board has deducted the applicants' Alaska production and Chevron's California production from the applicants' total United States production forecast in order to obtain a measure of the applicants' projected production in Districts I to IV. The levels of Districts I to IV production which result from this calculation are some 500 thousand barrels per day lower in 1975 than Chevron's forecast for the same region. In 1980, the difference between the two forecasts amounts to 1.6 million barrels per day and reflects the fact that the estimates derived from the applicants' forecast exhibit a decline in Districts I to IV production between 1975 and 1980, whereas Chevron's estimates assume continued growth.

In view of the fact that the two forecasts for Districts I to IV appear to reflect, respectively, the simultaneous realization of pessimistic and optimistic assumptions for the regions involved, the Board believes that some intermediate case is more probable. Moreover, the Board recalls that it has been unable to assess the relative merits of these estimates in terms of the underlying assumptions. The Board, therefore, believes that equal weight should be assigned to the two estimates. The Board has computed an average of these estimates and notes that, although there is considerable variation in absolute terms between this average case and the two extreme cases, the proportional variations are only 2.5 per cent in 1975 and 8.0 per cent in 1980. The Board does not consider these proportional variations to be excessive in terms of the uncertainties involved. The Board also observes that similar variations are evident in the available estimates of current United States production capabilities. Therefore, the Board believes that it is justifiable to utilize the average production case relating to Districts I to IV for the purposes of examining the future deficiency of supply.

District V

California. The Board has considered Chevron's estimate of California production and believes the projections to be reasonable in 1970 and 1975. Accordingly, the Board has adopted Chevron's forecast for these years. However, the Board notes that Chevron's estimates predict a decline in California production between 1975 and 1980, whereas Chevron indicated in its

oral evidence that this trend might be arrested as a result of future discoveries. In recognition of the possibility of offshore discoveries, the Board believes that a constant level of California production should be maintained between 1975 and 1980 in its own forecast.

Alaska. The Board believes that Chevron's projection of Cook Inlet production at a constant level of some 250 thousand barrels per day throughout the forecast period is realistic in view of recent pressure declines experienced by reservoirs in this area. Regarding production from the Prudhoe Bay area, the Board has reviewed the evidence presented at the hearing and the press release issued by the chairman of Atlantic Richfield on July 18, 1968, which is reproduced in Appendix B of this report. The Board believes that the confidence expressed in the two recent discoveries by a well known firm of consultants necessitates the inclusion of an allowance relating to prospective production from the Prudhoe Bay area. An additional consideration is the wide range of reserve estimates presented. It is the Board's opinion that this factor logically requires the preparation of high and low cases for production from the Prudhoe Bay area. In both the low and the high cases the Board has assumed that the new production would become available some time between 1970 and 1975.

For the low case, the Board has adopted Chevron's procedure of relating the level of Prudhoe Bay production to the minimum economic throughput of a pipe line extending to tidewater, and

believes an allowance of 250 thousand barrels per day by 1975 to be appropriate for this purpose. However, in order to reflect the strength of industry's current expectations, the Board has increased the level of Prudhoe Bay production to 500 thousand barrels per day by 1980. The resultant level of total Alaskan production in the low case increases from 250 thousand barrels per day in 1970 to 500 thousand barrels per day in 1975 and 750 thousand barrels per day in 1980, and therefore is somewhat similar to the applicants' forecast for this area by the end of the period.

For the high case, the Board has made an allowance for Prudhoe Bay production amounting to 1.0 and 1.5 million barrels per day in 1975 and 1980, respectively, which appears to be a reasonable reflection of the more optimistic reserve estimates for the area. The resultant level of total Alaskan production in the high case increases from 250 thousand barrels per day in 1970 to 1,250 thousand barrels per day in 1975 and 1,750 thousand barrels per day in 1980.

The low and high cases of United States production which the Board will utilize in examining the future United States deficiency are shown in Table X-10, which also includes Chevron's projection for Districts I to IV production and the projection for this region derived from the applicants' forecast.

Table X-10

United States Conventional Production of Total Liquid Hydrocarbons
(thousands of barrels per day)

	Districts I-IV			District V					Total U.S.	
	Applicants (estimated)	Chevron	Board Average	California	Alaska Low	Alaska High	Total Low	Total High	Low*	High**
1970	9,175	9,566	9,370	1,115	250	250	1,365	1,365	10,735	10,735
1975	9,880	10,380	10,130	1,225	500	1,250	1,725	2,475	11,855	12,605
1980	9,532	11,170	10,351	1,225	750	1,750	1,975	2,975	12,326	13,326

* Low United States production = Board Average for Districts I to IV + Low District V

** High United States Production= Board Average for Districts I to IV + High District V

Deficiency of United States Domestic Oil Supply. The Board's principal concern in this section is to assess the total future dependence of the United States on external sources of supply. The Board believes that total United States import requirements are more significant than the location of deficiencies on a regional basis, since the ability to alleviate particular regional deficiencies by means of internal supply arrangements is restricted by the size of the overall deficit. However, the Board sees merit in maintaining a distinction between Districts I to IV and District V, insofar as such an approach may be related directly to the terms of the existing United States oil import program and also permits an analysis of developments within specific markets. Accordingly, the Board has made an examination of deficiencies on a regional basis, preparatory to assessing total United States reliance on imports.

The United States oil import program is considered in detail in Section XI but may be summarized briefly here. At the present time, the United States imposes a limitation on the total volume of imports entering Districts I to IV, whereas the entry of imports into District V is determined solely by the excess of demand over domestic supply. In Districts I to IV, imports of residual fuel oil are determined on a similar basis to District V imports, but imports of all other oils are limited to 12.2 per cent of Districts I to IV production. Table X-11 shows the gross deficiency in Districts I to IV and the net deficiency obtained after deduction of estimated residual fuel oil imports; the net deficiency is also expressed as a proportion of the Board's average for Districts I to IV production.

Table X-11

Districts I to IV:
Estimated Deficiency of United States Conventional
Total Liquid Hydrocarbons Supply
(thousands of barrels per day)

Year	Gross Deficiency (1)	Fuel Oil Imports (2)	Net Deficiency (3)	Net Deficiency as a percent of Production (4)
1970	2,480	1,190	1,290	13.8
1975	3,290	1,400	1,890	18.6
1980	4,719	1,550	3,169	30.6

The estimates of fuel oil imports in Table X-11 are taken directly from Chevron's evidence. The Board notes that Chevron's numbers for fuel oil imports exhibit a rate of growth which is substantially lower than the historical rate, a trend which the Board believes to be realistic in view of anticipations regarding future

competition from natural gas and more modest declines in the residual yields of domestic refineries. The Board observes that in 1975 and 1980 the net deficiency substantially exceeds 12.2 per cent of estimated Districts I to IV production under the Board's average case. Therefore, some relaxation of existing regulations seems likely in these years unless Districts I to IV production can be supplemented by sufficiently large transfers of oil from District V. The latter prospect may be appraised with reference to Table X-12, which depicts high and low deficiencies in District V based respectively on the Board's low and high production estimates for this area.

Table X-12

District V:
Estimated Deficiency of United States Conventional
Total Liquid Hydrocarbons Supply
(thousands of barrels per day)

Year	Gross Deficiency	
	Low*	High
1970	585	585
1975	(195)	555
1980	(245)	755

* () denotes surplus

The high case depicts a constant level of deficiency in District V between 1970 and 1975, and a growing deficiency between 1975 and 1980, which would not permit the transference of significant volumes of oil from District V to Districts I to IV. By contrast, in the low case, the deficiency experienced by District V in 1970 is converted into a surplus by 1975, which increases up to 1980. Assuming a continuation of District V imports at

the 1970 level, large volumes of oil would be available for transfer from District V to Districts I to IV between 1975 and 1980, In 1975, the volumes of transfers would be sufficient to contain Districts I to IV imports within the currently permissible level. However, by 1980, it appears that it would be physically impossible to effect the same kind of adjustment.

Table X-13 following shows the high and low cases for the total United States deficiency which result from combining the gross deficiency for Districts I to IV with the high and low deficiency cases for District V. The Board believes that an assessment of total United States import requirements must also include an allowance relating to future United States synthetic production. In the Board's judgment, the estimates provided by the applicants and Chevron are broadly representative of current expectations regarding United States synthetic production and therefore are suitable for adoption as high and low projections, respectively. It is the Board's belief that the high projection for United States synthetic production will be realized only in conjunction with a high deficiency, and that the converse would apply for the low estimate of synthetic production. Accordingly, the Board has deducted the applicants' projected United States synthetic production from the high gross deficiency, and Chevron's projection from the low deficiency, in order to derive the high and low estimates of total United States imports shown in columns (5) and (7) of Table X-13.

Table X-13

Total United States:
Estimated Imports of Total Liquid Hydrocarbons
(thousands of barrels per day)

Year	Gross Deficiency Low (1)	Gross Deficiency High (2)	U.S. Synthetic Production Low (3)	U.S. Synthetic Production High (4)	Total U.S. Import Requirements Low Case (5)	% U.S. Demand (6)	High Case (7)	% U.S. Demand (8)
1970	3,065	3,065	-	-	3,065	22.2	3,065	22.2
1975	3,095	3,845	-	100	3,095	19.7	3,745	23.8
1980	4,474	5,474	100	500	4,374	24.6	4,974	27.9

In 1970, both cases embody the same assumptions and therefore show equivalent import requirements of 3.1 million barrels per day. In 1975, United States import requirements remain at the 1970 level in the low case, but increase to some 3.7 million barrels per day in the high case. Subsequent to 1975 a similar increase in import requirements is experienced in both the low and high cases, resulting in total levels of import requirements in 1980 of some 4.4 and 5.0 million barrels per day, respectively. The fact that the difference between the two cases remains virtually constant in 1975 and 1980, reflects the compensatory nature of variations in the assumed levels of conventional and synthetic production.

The Board believes that the proportion of United States demand supplied by imports is an equally important measure of United States dependence on external sources of supply. This aspect of total United States import requirements is shown in columns (6) and (8) of table X-13 for the low and high cases, respectively. In the low case, the proportionate reliance of the United States on imports declines between 1970 and 1975, but subsequently exhibits

an increase. Moreover, by 1980, the proportion of United States demand supplied by imports in the low case is significantly greater than the present day level of some 21 per cent. The high case predicts that proportionate reliance on imports will exhibit a gradual increase up to 1975, but will increase rapidly thereafter.

XI THE UNITED STATES OIL IMPORT PROGRAM

Summary of United States Oil Import Program

The Mandatory Oil Import Program of the United States was established by Presidential Proclamation 3279 issued on March 10th, 1959. The statutory authority for the program relates to national security considerations. The national security was interpreted primarily in terms of a necessity to maintain a vigorous, healthy domestic petroleum industry and thus to satisfy strategic objectives including the prevention of dislocations in oil supplies.

In its current operation the program may be described as follows. The maximum level of imports of crude and unfinished oils[1] and finished products is determined on January 1 of each year for the year ahead. A distinction is observed in the allocative mechanism between Districts I to IV and District V[2]. Imports into District I to IV of crude oil and products other than residual fuel oil are limited to 12.2 per cent of the anticipated amount of domestic crude oil and natural gas liquids production in these Districts. Imports of crude oil and products including residual fuel oil into District V and of residual fuel oil on the East Coast are permitted to the extent nec-

---

(1) The Presidential Proclamation 3823 of January 1968 made it clear that Tar Sands oil was included in these categories.

(2) The location of these Districts is shown by the Map, page 140.

essary to meet the anticipated difference between demand and domestic supply.

Expected overland movement of oil from Mexico and Canada for the allocation period are deducted from the total permissible level of imports to obtain the level of overseas imports. The overseas imports so authorized are allocated to companies, not to individual plants or refineries, by a quota system. The overall total of imports available for licensing subsumes many sublimitations by product category and special situations not appropriate for administration under the general terms of the program(3). Allocation of crude and unfinished oil to refining companies are based on historical imports or a proportion of refinery inputs. The latter system uses a graduated scale, whereby the quota earned at high levels of inputs is proportionately less than at lower levels. Eligible inputs exclude overland imports. Inland refiners not processing overseas oil may arrange exchanges with coastal refiners on a volumetric basis.

The Board's understanding of the treatment of Canadian oil under the import program is that notwithstanding exemption from licensing requirements, importers of Canadian oil in Districts I to IV are not currently obtaining all the Canadian supplies they wish to buy, basically for the reason that an

---

(3) Bonded oil satisfying 'overseas' requirements is excluded from demand and supply and as such is external to the Policy.

objective of United States and Canadian oil policies is to accommodate increased volumes of Canadian oil while avoiding undue disruption of United States oil markets. The understandings that exist for the implementation of this policy objective have been referred to as "a framework of agreement" which operates through periodic exchanges and discussions between the two countries on the acceptable levels of refinery feedstock exports. The arrangements relating to Canadian oil export levels are often spoken of as "informal restraints".

Historical Summary of Imports

To clarify numbers referred to by companies at the hearing, the Board has prepared two historical summary tables. Table XI-1 shows the United States supply-demand balance for all liquid hydrocarbons, viz. crude oil, pentanes plus, butane, propane and all liquid products including residual fuel oil. The table is primarily based on United States Bureau of Mines (USBM) data; the term 'net' in all cases indicates imports less exports. Column (1) shows total domestic production. Column (2) comprises net overseas imports of liquid hydrocarbons, excluding residual fuel oil, and assumes net residual fuel oil imports, net Mexican and net Canadian imports as shown in columns (2A), (3) and (4). Column (2A) was computed by deducting net imports of Canadian residual oil as reported by the Dominion Bureau of Statistics (DBS), from total net imports of residual oil: it was assumed that net imports of Mexican residual oil were zero. Column (3)

was based on USBM data for net imports of Mexican oil and Board estimates of net imports of Mexican products. Column (4) utilized USBM data for Canadian imports of oil into the United States and DBS data for both United States exports of oil to Canada and net imports of products. Column (5) used USBM figures for domestic product demand, excluding processing gains but including crude oil losses.

Over the period 1960 to 1966 inclusive, overseas net imports of liquid hydrocarbons varied between 15.6 and 17.5 per cent and averaged some 16.1 per cent of the total demand for petroleum products. The net imports from Canada rose steadily from some 1 to 3 per cent of total demand by 1967. The figures for 1967 are affected by the Suez crisis.

Table XI-1

United States Supply of and Demand for Total Liquid Hydrocarbons, 1960-1967
(thousands of barrels per day)

	(1)	(2)	(2A)	(3)	(4)	(5)	(6)	(7)
Year	Total Domestic Production	Net Overseas Imports of Liquid Hydrocarbons, Excluding Residual Fuel Oil	Net Overseas Imports of Residual Fuel Oil	Net Mexican Imports of Liquid Hydrocarbons	Net Canadian Imports of Liquid Hydrocarbons	Total United States Demand for Petroleum Products	Overseas Imports $\frac{(2)+(2A)}{(5)}$ %	Canadian Imports $\frac{(4)}{(5)}$ %
1960	7,965	920	585	20	92	9,661	15.6	0.95
1961	8,174	934	621	20	168	9,806	15.9	1.71
1962	8,353	983	684	20	226	10,234	16.3	2.21
1963	8,640	956	706	20	240	10,560	15.7	2.27
1964	8,769	1,019	748	20	270	10,816	16.3	2.50
1965	9,014	1,086	894	20	281	11,303	17.5	2.49
1966	9,579	1,026	985	30	334	11,850	17.0	2.82
1967	10,222	812	1,003	30	384	12,276	14.8	3.13

Source: U.S. Bureau of Mines and Dominion Bureau of Statistics.

Table XI-2 depicts the volume of overseas and Canadian crude oil and products imported into Districts I to IV and V. In this table, columns (1) and (5) solely relate to crude oil. Columns (2) and (6) were derived by the difference between total net imports of crude oil and products based on USBM data and Canadian imports as shown in columns (3) and (7). The latter were compiled from both USBM and DBS data.

Table XI-2

Net Imports of Crude Oil and All Products
to the United States
(thousands of barrels per day)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	United States Districts I to IV				United States District V			
	Overseas and Mexico		Canadian Crude Oil and Products		Overseas		Canadian Crude Oil and Products	
Year	Crude Oil	Products		Total	Crude Oil	Products		Total
1961	645	713	86	1,444	209	8	82	299
1962	664	780	109	1,553	226	17	117	360
1963	673	808	122	1,603	214	-13	118	319
1964	672	875	137	1,684	244	-4	133	373
1965	681	1,030	156	1,867	259	30	125	414
1966	672	1,130	185	1,987	202	37	149	388
1967	487	1,168	212	1,867	157	33	172	362

Source: U.S. Bureau of Mines and Dominion Bureau of Statistics.

Again, in 1967 the data reflect the Suez crisis. In Districts I to IV, overseas and Mexican net imports of crude oil showed only a minor increase of some 27,000 barrels per day from 1961 to 1966, whereas Canadian net imports of crude oil and products increased by some 100,000 barrels per day over the same period. Net imports of overseas and Mexican products rose by some 400,000 barrels per day from 1961 to 1966. Most of this increase represents residual fuel oil. In District V, overseas and Mexican crude oil imports in 1966 were approximately the same level as in 1961; Canadian imports of crude oil and products increased by some 70,000 barrels per day over the same period.

Interpretation of United States Oil Import Program

(1) Views of the Applicants

The Mandatory Program was imposed in 1959 to satisfy the objective of national security. The applicants interpreted 'national security' to include both the possible disruption of supplies for the domestic market due to international conditions and the preservation of incentives for domestic producers. The crises of 1952, 1956 and 1967 confirmed to the applicants the wisdom of a policy which did not rely heavily on overseas sources of supply. The effect of the import policy had been to hold overseas imports virtually constant at a level of some 16 per cent of total demand. The applicant inferred that this level represented the United States Government's policy objective with respect to the desirable degree of reliance on overseas imports.

Mr. Daniel, witness for the applicants, cited an article by Dr. R. Gonzalez, a petroleum consultant in the United States, as supporting this view. Furthermore, the applicants expressed the belief that the domestic industry should have the ability to satisfy about one-half of the level of overseas imports in the event of a disruption of supply. The applicants considered that this latter objective would be satisfied by restraining domestic production to a nine year life index.

The applicants contended that the difference in the treatment of overseas and overland imports within the program reflected national security considerations. Canada had supplied all the additional growth in imports of crude oil in the United States since 1959; imports of crude oil from overseas had remained nearly constant. This pattern indicated to the applicants the reliance placed by the United States on Canada. In addition, the trading relationship between the two countries favoured increasing imports of oil from Canada.

The applicants anticipated that the United States would prefer to restrict overseas imports to some 16 per cent of total demand unless necessity dictated otherwise, as could arise if there were a deficiency in conventional and synthetic supplies in North America. The forecasts prepared by the applicants indicated a substantial growth in the deficiency of the United States' supply, as shown in Section X. Since the United States' conventional industry would be unable to meet the growing demand,

and given the objective of not permitting reliance on overseas sources to exceed 'national security' levels, the country would look towards Canadian imports and the development of a synthetic industry as the only economically feasible alternative sources of supply. The applicants believed it improbable that Venezuela would be able to meet a significant portion of the United States' growing requirements.

Under these circumstances, the applicants believed a strong and increasing reliance on Canadian sources of supply would be inevitable. Consequently, existing restraints on the importation of Canadian oil would become progressively more responsive to the 'economic' market demand to the extent that by about 1974, the impact of such restraints would be negligible. In short, by about 1974, the level of Canadian imports would be determined by the natural economic demand rather than by artificial restrictions.

(2) Views of Mobil

Mobil's analysis of the import program was predicated on its interpretation of the historical development of the program and its assessment of future policy considerations. Mobil contended that the levels at which United States' imports were established by the mandatory program reflected relationships which existed during the period 1952 to 1954. The program was fundamentally concerned with the health of the domestic producing industry. Mobil agreed that increases in foreign supplies would be required, with the operation of the domestic producing

industry at capacity in the mid to late 1970's. However, Mobil contended that these circumstances would generate policy factors substantially and significantly different from those concerned in the original determination of the import policy. As such, Mobil took the position that the applicants' extrapolation of the 16 per cent figure into the 1970's as a national security criterion was not sound.

Mobil believed that the commitments of the United States as a trading nation, the position of the western hemisphere, new overseas sources of supply and the benefits which accrue to the economy through lower cost raw materials should be considered in evaluating the direction of future changes in the policy. Such considerations would dictate a sharing of the United States deficit by overseas sources at an increasing, rather than an historically derived, rate. Mobil cited various pressures impinging on the import policy: preferences for Puerto Rico and the Virgin Islands, the desire of petrochemical companies for overseas feedstock, trade-zone proposals, consumer requests for fuel oils and the use of bonded fuels. These influences were directed towards an increase in the use of overseas oil in the United States market.

Mobil stated that under these circumstances controls on the importation of foreign oil into the United States would be maintained for a long time, and that Canadian exemption from specific quotas would continue to be determined by negotiation between the respective Governments within the framework of the import program.

(3) Views of Chevron

Chevron agreed with Mobil's interpretation of the origin and history of the Oil Import Program. It did not believe that restraints placed upon the movement of Canadian oil would be terminated before 1975. No evidence of such a development was indicated in discussions by representatives of Chevron with United States Government officials. Chevron contended that the national security foundation for the imposition of the policy should not be interpreted as 'security' in a strict military sense. Chevron stated that national security included the preservation of a healthy United States domestic oil producing, transportation, refining and marketing industry and a healthy and competitive petrochemical industry. Also, it embraced the preservation of economic ties with foreign nations, in particular the political security of the western hemisphere, including Venezuela, and the encouragement of developments in United States dependencies such as Puerto Rico.

Chevron did not attach significance to the historical 16 per cent figure referred to by the applicants as a policy guide line. It argued that the 16 per cent figure was a consequence of the administration of the policy, and not an objective or target. In summary, Chevron contended that there was no reason to believe that, in the foreseeable future, the United States import program would change or that Canadian oil would not be subject to restraints.

(4) Views of IPAC

Mr. Rich, the witness for IPAC, believed the Oil Import Program was under constant and increasing pressure from several sources. The principal sources of pressure listed by Mr. Rich were:

(a) the continuing interest of prorated domestic producers in limiting imports,

(b) the possibility that legislative enactment of the policy could impose rigid limits,

(c) the interest of the petrochemical industry in obtaining access to foreign feedstocks, particularly in the light of the impending Kennedy tariff reductions,

(d) the growing importance of air pollution considerations, which may involve quotas to encourage the manufacture of sweet residual fuel oil,

(e) the desire of oil companies not to see their import quota benefits reduced as a result of a downward pressure on import allocation permits,

(f) the demands for exemption from the policy for special products, such as asphalt,

(g) the continued special treatment of the western hemisphere for national security and international reasons - in particular, increasing pressure may be anticipated from Venezuela,

(h) the coal industry's concern over low cost foreign crude oil imports,

(i) the importation of Venezuela oil into Eastern Canada is felt by many domestic refiners to be in the nature of interchange outside the framework of the quota system. Refiners entitled to import quota allocations but unable to use Canadian oil believe they are penalized,

(j) the controls on foreign investment instituted since January 1968 will increase the level of potential investment in the United States by companies repatriating funds and may generate additional reserves,

(k) the economic and availability pressures created by the existence of Capline,

(l) the growing traffic in bonded fuels which have exempt status,

(m) the establishment of trade zones which enables certain plants to process foreign feedstock outside the scope of the import program,

(n) the policy of encouraging the economic development of Puerto Rico and the Virgin Islands. Increased quota allocations have been granted for the construction of refineries in these areas.

IPAC concluded that these pressures would continue, would tend to erode the import program and would provoke greater resistance to the importation of Canadian oil. Canadian oil would not enjoy unrestricted access to United States markets and might in fact be subject to more formal regulations than in the past.

(5) Views of the Board

The Board recognizes that the future course of the United States Oil Import Program, and its impact on imports from Canada, is a most complex matter which will be influenced and determined by a host of factors probably including all of those referred to by the applicants and the interveners. Also, as mentioned in Section VI, the Board realizes that it cannot possibly make a complete appraisal of these factors and arrive at a fully definitive conclusion. Nonetheless in considering the present application the Board has the responsibility of forming a general judgment of what any future United States policy may mean in so far as the marketing of Alberta crude oil is concerned and it believes that this may be done on the basis of the evidence of the applicants and the interveners and its own knowledge of the situation.

The Board has appraised the evidence and the situation generally in terms of the following three matters.

(a) The Historical and Probable Future Purpose of the United States Oil Import Program.

(b) The Relative Advantages of Overseas and Canadian Oil.

(c) Appraisal of the Growth in the Future Deficiencies in United States Indigenous Supplies.

In its consideration of these matters the Board has thought it wise to seek counsel from the National Energy Board. Accordingly, it sought and obtained approval from the Chairman of that

Board for consultations concerning the factors which have had and will in the future probably have a bearing on the United States Import Program and particularly on the treatment of Canadian oil as a source of United States supply. The Board acknowledges the assistance it has received in these matters from the National Energy Board, but the fact that it has had this assistance is not to be taken as an indication that the National Energy Board endorses any or all of the views expressed here. The views are those of this Board alone and it accepts full responsibility for them.

The three matters referred to and the Board's general conclusions concerning them are dealt with in the following:

(a) The Historical and Probable Future Purpose of the United States Oil Import Program

While the applicants and the interveners placed different emphasis on some of the factors involved in the original formulation and the administration of the United States Oil Import Program, all parties appeared to accept that oil import controls of some kind would be continued indefinitely into the future.

The Board accepts that the purpose of the present program, which rests on national security considerations, extends beyond purely strategic considerations and emphasizes the maintenance of a healthy domestic oil industry and the preservation of certain United States trading relations. In addition the Board concurs that some system of control of imports of crude oil and products into the United States will in all probability be continued indefinitely into the future. During the future adminis-

tration of the program, in its present or a modified form, the Board assumes that the broad purpose will be unchanged and believes it likely that if greater reliance is required to be placed on foreign supplies no less, and perhaps more weight than in the past will be assigned to the strictly strategic aspects of the national security.

(b) The Relative Advantages of Overseas and Canadian Oil

In appraising the shares of any deficiency in indigenous supply which will come from overseas and from overland (essentially Canada), the United States will have regard to the many individual factors referred to by the applicants and the interveners. Of particular importance, it seems to the Board, will be a consideration of North American defence and the necessity of continued close co-operation between the United States and Canada in all matters having a bearing on the security of North America.

The Board agrees with the interveners that many competing groups seek to obtain access to overseas supplies, and that the economic attractiveness of these feedstocks, at least in certain markets, is likely to continue into the mid-1970's. The Board anticipates that the chemical industry and integrated companies with overseas production interest, in particular, will wish to increase their intake of cheaper overseas supplies. Moreover, the Board believes that as the United States approaches capacity production more conscious weight may be given to energy cost factors in the formulation of United States policy.

The applicants maintained that United States policy makers, in the interests of national security, "will attempt to limit offshore imports to some 16 per cent of demand". It recognized that in practice this objective might not be achieved but contended that a much greater reliance on overseas imports would be imprudent.

The Board agrees that the historical data provide the only quantitative indication of the level of overseas supplies as compared to overland supplies which the United States in the past has considered compatible with national security. While the Board does not fully accept that the 16 per cent relationship was the actual objective of the import program, it is a fact that during the last eight years overseas imports of crude oil and products have represented between 15.6 to 17.5 per cent of total United States demand. Furthermore, during this same period overseas imports of crude oil itself have remained relatively stable whereas overland imports have increased from less than 1 to more than 3 per cent of the total United States demand. The Board believes that the relative constancy of the overseas imports of crude oil and the increasing reliance which the United States has been placing on overland imports is an indication of the policy thinking of the United States.

In the preceding section the Board estimated the probable range of deficiencies which is to be expected in the United States indigenous supply of crude oil for the years 1970, 1975 and 1980, after allowing for reasonable growth in the supply of

United States synthetic crude oil. As the Board sees it, the general policy of the United States with respect to import regulations on foreign crude oil, and particularly whether or not the entry of Canadian oil into the United States will continue to be regulated or restrained, will depend largely on the magnitude and location of these deficiencies. The Board also assumes that when the United States is assessing whether, for reasons of national or continental security, greater reliance should be placed on overland imports, it will have regard for the ability of Canada to supply increased volumes. The United States will take into account the substantial surplus producing capacity of the conventional oil industry in Alberta, the very large reserves of the Alberta oil sands and their capacity to produce synthetic crude oil, and the potential of the virtually unexplored areas of northern Canada. Furthermore, it seems likely that the United States will look largely to Canada as a source of supply for deficiencies which may develop in the northern part of District II.

(c) Appraisal of the Growth in the Future Deficiencies in United States Indigenous Supplies

In an endeavour to develop reasonable estimates of the growth in United States deficiencies which will have to be supplied by increases in the supply either from Canada or from overseas, the Board has taken as a basis for the estimates the future situation which would result if

(a) overseas imports were continued at a level of some 16 per cent of the total United States demand,

(b) overland imports from Canada were continued, as estimated in Section VIII, reflecting the recent growth trend, and

(c) overland imports from Mexico were continued at the present level of some 30,000 barrels per day.

In expressing its estimates of the growing United States deficiency in relation to these assumptions, the Board does not intend to imply that it necessarily expects the United States, in its determination of the desirable levels of overseas and Canadian imports, to be guided by the "16 per cent rule" subscribed to by the applicants. The Board sees good reasons why this percentage dependency on overseas imports could be reduced and on the other hand, as emphasized by the interveners, there are also reasons to suggest that the future share of United States demand which may be met by overseas imports could be somewhat greater than in the past. The Board uses the 16 per cent figure, and a projection of the historical trends in the Canadian supply, only for the purpose of making some appraisal of the growing deficiency which the United States will have to satisfy by an increase in one or both of its principal foreign sources of supply.

The Board's estimates of the range of remaining deficiencies calculated on this basis appears in Table XI-3. Columns 1 and 2 of this table give the Board's low and high estimates of the gross deficiency in United States supply, as developed in

Section X. Column 3 gives the overseas imports on the assumption that they will represent 16 per cent of the total United States demand, while Column 4 indicates the imports from Canada as developed in Section VIII which represent a continuation of the recent growth pattern without allowance for any large growth in United States requirements. Column 5 gives the assumed imports from Mexico. Columns 6 and 7 give the resulting low and high remaining deficiencies based on the aforementioned assumptions.

Table XI-3

Range of Remaining Deficiencies
in United States Supply
(thousands of barrels per day)

	Total United States Import Requirements		Assumed Overseas Imports	Assumed Canadian Imports	Mexican Imports	Remaining United States Import Requirements	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Low	High	(see text)	(see text)		Low	High
1970	3,065	3,065	2,210	513	30	312	312
1975	3,095	3,745	2,520	702	30	(157)	493
1980	4,374	4,974	2,850	965	30	529	1,129

( ) denotes surplus.

The Situation Expected in 1970

Referring to the remaining deficiencies indicated in Table XI-3 for 1970, and before any significant supply might be expected from the Arctic slope of Alaska, it appears that remaining deficiencies of the order of 300,000 barrels per day might result if the United States were to restrict its overseas import to the level indicated and assuming that Canadian imports were those estimated in Section VIII. Bearing in mind the magnitude of the deficiency indicated, it is clear that the deficiency could be met by a proportionately small increase in the level of overseas imports together with some increase in imports from Canada and, given the likely existence of spare capacity, by an increase in United States domestic production. The situation suggests to the Board that some, but not full relaxation of restraints on the import of Canadian oil would occur.

The Situation Expected in 1975

In 1975 the estimated remaining deficiencies would be nearly 500,000 barrels per day if the assumed minimum development in Alaska should occur (high deficiency case). On the other hand if the maximum assumed development should take place in Alaska (low deficiency case) there would be a surplus, on the basis of the assumed overseas and Canadian imports, of some 150,000 barrels per day and one or both of these imports might have to be reduced.

The high deficiency case suggests to the Board that the requirements of the United States for additional foreign supplies would be such that in all probability it would wish to draw

increasingly upon Canadian supplies. This view is further supported by the fact that substantial shortages would exist within Districts I to IV. The Board concludes that under this case restraints on the import of Canadian oil would have been removed and Canadian oil would have reached its full economic market in the United States within the period 1973-1975.

On the other hand the low deficiency case, corresponding with the assumed maximum Alaskan developments, suggests that some restrictions might remain in effect by 1975.

For these reasons the Board believes that the United States policy towards Canadian oil in and just prior to 1975 will be critically dependent upon the magnitude and rate of development of discoveries in the Arctic slope of Alaska. If these are of the magnitude suggested by the applicants and reflected in the Board's high deficiency case, the Board believes, with the applicants, that restrictions on the import of Canadian oil will be removed shortly before 1975. If the Arctic slope developments are large, the Board sees continuing normal growth of Canadian imports but little prospect of complete removal of restrictions on them until after 1975.

The Situation Expected in 1980

In 1980 the estimated remaining deficiencies would range from some 500,000 to 1,100,000 barrels per day depending upon the size of the Arctic slope discoveries as reflected in the low and high deficiency cases. To the Board these figures

indicate that even in the low deficiency case before 1980 the United States will have to look to further foreign supplies and given any desire not to increase significantly its dependency on overseas oil it will look increasingly to Canada. By the 1980's then the Board would expect Canadian crude oil to be welcomed without restriction into the United States market.

The Effect of Uncertainties in the United States Demand and The Expected Supply from Districts I-IV and California

The high and low deficiency cases developed in Section X and used in this analysis reflect the large uncertainties in the future production which may be expected in Alaska but assume a single United States demand projection, average estimates of production from Districts I to IV, and, essentially, the Chevron estimate for production from California. There are uncertainties in these figures as well, particularly in 1980, and to the extent that they may prove high or low the deficiencies would be modified accordingly. This means the range between the high and low deficiency could be greater. The Board doubts, however, that all factors which could contribute to either a high or a low deficiency are likely to operate together. Accordingly, while the Board recognizes the possibility of a wider range in the deficiencies than is shown in Table XI-3 it does not consider this probable and believes its conclusions based upon Table XI-3 to be sound.

Summary of the Board's Views

In summary, the Board believes that, for reasons of national and continental security and having regard for Canada's growing reserves and producing capacity, the United States will look increasingly to Canada to supplement its own supplies. The Board does not believe, nor did the applicants or the interveners, that all restrictions on the import of Canadian oil to the United States are likely to be removed by 1970. Whether such restrictions are likely to be removed by or before 1975 is critically dependent, in the Board's view, upon the magnitude and rate of development of discoveries on the Arctic slope of Alaska. If these are of the order estimated by the applicants, the Board agrees with the applicants that the probabilities favour the removal of restrictions shortly before 1975. Conversely if the developments result in production of the order of the Board's high production case, some restrictions will probably continue through the mid-1970's but would likely be fully removed in the late 1970's or by 1980.

XII APPLICANTS' MARKETING PLAN

The participatory share of Imperial Oil, Atlantic Richfield and Cities Service in the disposition of products from the proposed plant amounted to 30 per cent each. Under the anticipated output of 50,000 barrels per day of synthetic crude oil, 25,000 barrels per day of specialty oil and 5,000 barrels per day of naphtha, each such share amounts to 15,000 barrels per day, 7,500 barrels per day and 1,500 barrels per day of the respective products. The responsibility for the disposition of the remaining 10 per cent of the plant output - amounting to 5,000 barrels per day of synthetic crude oil, 2,500 barrels per day of specialty oil and 500 barrels per day of naphtha - was Royalite's. The manner in which each participant intended to dispose of its share of production is summarized below. Each applicant used the designation 'new within reach' markets and 'beyond reach' markets in the sense invested in these terms by the Alberta Government's 1968 Oil Sands Policy Statement.

Synthetic Crude Oil

(1) Views of the Applicants

Imperial Oil Limited. Imperial intended to dispose of its share of the synthetic crude oil and any conventional oil required by the Policy by agreement with its affiliate, Humble Oil and Refining Company (Humble). The commitment by Humble to purchase these volumes was tendered in letter form at the hearing and extended for a period of five years. Humble indicated its

intention to renegotiate the commitment at the end of this period. Humble's refineries in the United States are located at Baton Rouge, Louisiana, Baytown, Texas, Bayonne and Bayway, New Jersey, Billings, Montana and Benicia, California. The latter refinery is under construction. Humble indicated that its most likely disposition of the synthetic crude oil and any required conventional oil would be in the Chicago area under arrangements which may include a processing agreement to supply Humble's Mid-West product requirements, an exchange agreement involving Humble's Gulf Coast refinery or processing at a Humble refinery in the Chicago vicinity. With respect to the latter, no such plant exists at present, but its construction is a possibility over the long term.

Humble contended that inasmuch as it did not currently process Canadian oil in the Mid-West, the market it would provide represented a new market for Alberta oil. Furthermore, Humble believed its markets were additional to the 'normal' growth pattern for Canadian oil since its arrangements would increase the level of economic penetration by Canadian oil or satisfy a market available only to the synthetic crude oil by virtue of special characteristics. Humble indicated a possibility of it satisfying the 'beyond reach' criterion of the Oil Sands Development Policy but that it was more likely that 'new' within reach markets would be designated. Mr. Yeager, the witness from Humble, stated that Humble's inability to specify more definitive arrangements at this time reflected the impracticality of refiners entering into

commitments five years or so before the material would be available. Mr. Yeager stated the period prior to the designation of which refineries would process the synthetic crude oil and the conventional oil required by the Oil Sands Policy could vary from several years to a few months. Mr. Yeager agreed that the satisfaction of the marketing requirements of the Policy was predicated on the effective elimination of controls on the export of Canadian oil to the United States by 1974. Humble stated this would be the case and that its own independent studies indicated 'deficiencies' in United States supplies of the same order of magnitude as predicted by the applicants.

Atlantic Richfield. Atlantic Richfield stated that it is a net purchaser of crude oil in the United States and owns refineries on the East, Gulf and West Coasts. Atlantic Richfield contended that it had no plans in the foreseeable future to use Alberta oil other than in relation to the proposed oil sands undertaking. Atlantic Richfield intended to dispose of the synthetic crude oil in 'new' markets within reach and believed that the most probable arrangement would involve an exchange agreement for the processing of the synthetic crude oil and any conventional oil required by the Policy in the Chicago area. Mr. Smirlock, the witness for Atlantic Richfield, anticipated that Atlantic Richfield's refinery on the Gulf Coast would favour the consummation of such an agreement. Atlantic Richfield emphasized that it was not feasible to make specific exchange agreements far in advance of the availability of supply. Atlantic Richfield submitted that

the 'new' market criterion would be satisfied by virtue of the fact that Atlantic Richfield's refineries and the refineries with which exchange agreements were contemplated would not otherwise find the use of Alberta crude economically feasible.

If Atlantic Richfield were to construct a refinery in the Puget Sound area, it would consider processing synthetic crude oil and conventional oil at this plant. In the absence of such an arrangement, Atlantic Richfield stated that the Puget Sound refinery, if constructed, probably would process Alaskan oil. Atlantic Richfield believed this market would consequently qualify as 'new' within reach.

Atlantic Richfield anticipated that if 'quota' type restrictions between United States and Canada existed at the time when production from the plant became available, it would be unable to provide 'new' within reach markets in conformity with the Policy.

Cities Service. Cities Service proposed to sell its share of the synthetic crude oil production to Cities Service Oil Company (Cities), a United States affiliate. Cities stated it was a net purchaser of oil in the United States and currently does not use Alberta oil in its two United States refineries. The latter are located at Lake Charles, Louisiana and East Chicago, Indiana. Cities anticipated that it would probably process the synthetic crude oil and any required conventional oil at its Chicago refinery, or by exchange or processing agreement with another refiner in the Chicago area. Cities contended that it was not

possible to make such exchange or processing agreements five years in advance.

Cities proposed that its share of the synthetic crude oil production would be designated for 'new within reach' markets, since it considered that Cities' current long range plans did not contemplate the use of Alberta oil and that as such, these markets would otherwise not be available to Alberta supplies. In the absence of the necessity to utilize the synthetic crude oil and any required conventional oil, Cities expects to supply its requirements from non-Canadian sources. Cities contended that its lack of incentive to use Canadian conventional oil stemmed from an absence of proprietary interest and its investment in United States pipe line facilities. Cities also stated that its plans were predicated on the elimination of United States import restrictions on Canadian oil in 1974.

Royalite. Royalite, through The British American Oil Company Limited, proposed to sell its share of synthetic crude oil to Gulf Oil Corporation (Gulf). Gulf intended to process the synthetic crude oil and any associated conventional oil under the terms of the Oil Sands Development Policy, at its Toledo refinery. Royalite contended that this market would constitute a 'new' within reach market.

Mr. Hoskins, the witness for Gulf, testified that the processing of the amounts of conventional and synthetic crude oil was contingent upon approval of the application and would be over and above any volumes of Canadian oil consumed by the Toledo refinery

at the time when the commitment would become operative. Gulf anticipated that these volumes would amount to some 25,000 barrels per day in 1973 and would remain at this level thereafter, in the absence of the necessity to use synthetic supplies. This trend in Gulf's expected 'normal' growth in Canadian oil requirements was predicated on Gulf's long range plans, which involved a complex analysis of the factors affecting the optimum economic combination of several feedstocks available to the Toledo refinery. It was acknowledged that the qualification of the arrangement between Gulf and The British American Oil Company Limited as a 'new within reach' market was dependent on the elimination of restraints on exports of Canadian Oil to the United States by 1973 to 1974.

(2) Views of the Interveners

Mobil. Mobil contended that the markets proposed by the applicants for the disposition of the synthetic crude oil would only qualify as 'new' if imports of Canadian oil into the United States were unrestricted. Restrictions of Canadian imports would preclude satisfaction of the criterion of providing a net increase in the total market. Mobil expressed the view that by the mid-1970's the restraints on the movement of Canadian oil to the United States would not be removed and thus that the applicants' marketing plans would not qualify under the terms of the Oil Sands Development Policy. Furthermore, Mobil was concerned that approval of the application would create a pre-emptive position for the applicants as importers of Canadian oil. Mobil contended that the applicants' belief that their markets would be unavailable to conventional

producers was attributable to proprietary interests. Mobil suggested that while such markets might qualify as otherwise unavailable to prorated conventional oil, they would not be regarded as markets unavailable to unprorated conventional oil. Mobil considered that the creation of 'new' markets by virtue of inter-company economics would bestow an unfair advantage not only on the producers of synthetic crude oil vis-à-vis producers of conventional oil but also on the refiners of synthetic crude oil vis-à-vis refiners of conventional oil. Mobil believed that if 'new' markets were defined for synthetic crude oil on the basis of proprietary interest, the same treatment should be accorded to conventional oil. Premature approval of the applicants' proposal would result in a deterioration of the economic climate under which the conventional oil industry of Alberta had been developed and would be inconsistent with economic reality.

Chevron. Chevron believed that the marketing plans of the applicants did not create 'new' markets but really related to normal growth markets. Chevron further considered that the applicants' case was contingent upon the elimination of restraints on the movement of Canadian oil under the terms of the United States Oil Import Program. Chevron did not believe the latter situation would be realized during the period under review.

Chevron considered that if the term 'market' were interpreted as a refinery, then the applicants' statements on disposition did not permit determination of the destination of the synthetic crude oil, except in the case of Royalite. Agreements such as that

between Humble and Imperial were not to be taken seriously. Chevron believed that statements of intent to market in accordance with the Government policy requirements were not sufficient and that the applicants should demonstrate, as a condition precedent to approval, full compliance with the Oil Sands Development Policy. Chevron contended that the definition of markets under the Oil Sands Development Policy should be determined by objective tests and that factors of proprietary interest and inter-company arrangements had no place in an objective examination.

Chevron said that the laid down cost advantage of Canadian oil in the Detroit-Toledo and Chicago areas, the fact that conventional oil would shortly be available in the Chicago area and that the growth pattern of Canadian oil in United States markets was one of gradual expansion once the market was penetrated, indicated that the market areas referred to by the applicants could not be classified as new or beyond reach or as constituting a net increase in the total market.

Assuming a market is defined as a refinery, Chevron stated it was apparent that Royalite's proposal could not constitute a market 'not being served today', for the refinery stipulated currently consumed Canadian oil. With respect to the necessity for a new market to be one over and above normal growth, Chevron believed that Gulf's Toledo refinery did not qualify, since the amount of Canadian oil processed by this refinery had doubled over the period 1965 to 1967 and as such constituted a normal growth market.

IPAC. IPAC submitted that it was impossible to assess the applicants' contentions with respect to markets since they were subjective in character. In IPAC's opinion, the policies of individual companies were not relevant to the definition of markets except under two conditions. One would be where all controls respecting the import of Canadian oil into the United States were removed and sufficient time had elapsed to permit Alberta oil to realize its full economic penetration into the export market. The second condition would require the complete disclosure of the views and policies of all refiners in the market area concerned. However, IPAC contended that in fact access to United States markets would be determined by the United States import program and that, given the continuing existence of this program, the granting of the application would displace and supplant Canadian conventional crude oil in foreseeable markets.

In particular, IPAC believed that the Chicago market qualified as one to which Canadian oil would have physical access and one in which Canadian oil would enjoy a price advantage on the basis of laid down costs. IPAC anticipated that Canadian conventional oil would penetrate the Chicago market to the full extent permitted by Government policies. IPAC believed the restraints represented by the latter would undoubtedly continue in the future. As long as an artificial limit existed below the level of economic penetration, the internal economics of an individual refiner could not be tested. Given the existence of a ceiling on the exports of Canadian oil, imposed by Government policies, below the

producing capacity of the Canadian conventional oil industry and below full economic penetration, IPAC considered it difficult to visualize how any market in the Chicago area could be treated as one over and above the growth of existing markets or one representing an increase in the total market. With respect to Gulf's proposal to utilize Canadian oil over and above the potential limit, IPAC believed that the evidence provided by Gulf could not be examined or questioned in any meaningful fashion and that on the basis of past history, the anticipated abrupt termination of the utilization curve at 25,000 barrels per day was a matter of speculation.

In summary, IPAC argued that the evidence disclosed that the markets proposed by the applicants were in an area or of a type that represented normal growth markets for Canadian oil long before the proposed plant would be in operation. The effect of granting the application would not encourage greater growth in the total oil market but would simply give a share of that market to unprorated synthetic crude oil.

Banff. Banff contended that if the applicants' definition of 'new' markets were accepted, the growth in the market for conventional crude oil would be severely eroded at the discretion of integrated oil companies with interests in the oil sands or heavy oil areas. It was not apparent to Banff how synthetic crude oil entering market areas where Canadian conventional oil was or soon would be sold - for instance Puget Sound, Toledo and Chicago - could be treated as a new market. The Gulf proposal suggested

to Banff that the applicant was defining a new market as any volume over and above Canadian imports, regardless of location.

Banff believed that if the applicants were to serve new markets as defined by themselves, the control of the Alberta proration system would shift from the Government and the producing industry to refiners or companies with refining affiliations. Banff also suggested that if the philosophy of the applicants were adopted the output from the oil sands would be virtually open ended and mainly dependent on the refining and operating capacity of the owners of oil sands processing plants.

Canadian Fina. Canadian Fina contended that in their submission the applicants had made a minimal case in support of the qualification of their markets as 'new' within reach. Canadian Fina pointed out that each of the applicants stated they did not intend to fulfil the requirements concerned from Canadian sources in the event of the application being rejected, yet subscribed to a long range forecast which disclosed a sizable United States deficit. Canadian Fina stated that the applicants should be required to furnish clarification of the markets and thus satisfy the intention under the Oil Sands Development Policy of the protection of the conventional oil industry. However, in its argument, Canadian Fina indicated that the testimony of the applicants with respect to markets had provided sufficient clarification.

Great Plains. In the opinion of Great Plains, the applicants' marketing plans do not appear to comply with the Oil Sands Development Policy. Great Plains contended that the marketing

of oil sands production in the United States would directly or indirectly displace conventional Canadian oil. Great Plains said that the applicants should present specific information to show that the market to be supplied by the project could not directly or indirectly have been supplied by Canadian conventional oil.

Great Plains submitted that the applicants had produced insufficient evidence to ensure that the synthetic crude oil would be marketed in 'new' or beyond reach markets. Other than Royalite, none of the applicants had been able to state with certainty where the production would be disposed. Great Plains contended that the applicants' marketing plans were predicated on the absence of restrictions on the export of Canadian oil to the United States. Great Plains did not accept the contention that all formal or informal restraints against the importation of Canadian oil into the United States would be eliminated or relaxed prior to 1975 to a sufficient degree to permit marketing of the synthetic crude oil and any associated conventional oil without the displacement of other Canadian conventional oil. It appeared to Great Plains that even if restraints were lifted, the markets which the applicants proposed were normal growth markets for the Canadian conventional industry and would not represent a net increase in the total market.

Hudson's Bay. Hudson's Bay had no objection to the granting of the subject application if the assumptions that offshore imports into the United States would be limited to 16 per cent of domestic

demand for the foreseeable future and that informal restraints on the importation of Canadian oil into the United States would be entirely removed by the time the applicants' plant would be on stream, were realized. However, Hudson's Bay appeared to doubt that these assumptions would in fact be satisfied.

Specialty Oils and Naphtha

(1) Views of the Applicants

Each company stated at the hearing that if 'beyond reach' markets for naphtha were not available, this product would be blended with the synthetic crude oil, while a like volume of the heavier component of the synthetic crude oil would be diverted to the specialty oil stream. Hence, under these circumstances, the volume of synthetic crude oil for disposal would remain at 50,000 barrels per day, while the volume of specialty oil would increase to 30,000 barrels per day. The applicants' intention of marketing the specialty oil in 'beyond reach' markets remained unaltered.

Imperial Oil Limited. Imperial proposed to market the heavy specialty oil in Ontario in such a manner as to displace imports and transfers. Imperial's forecast of the supply-demand balance for heavy oils in Ontario and British Columbia is reviewed in Section IX. A survey in the Ontario area by the Marketing Department of Imperial indicated the receptivity of fuel oil customers to utilizing the low sulphur specification oil. Also, Imperial stated that its requirements for imported fuel oils would amount to some 15,000 barrels per day in 1970, and thus that it

would be in a position to accommodate the 7,500 barrels per day of synthetic heavy oils by direct import displacement. Accordingly, Imperial contended that its marketing plan would satisfy the beyond reach market criterion of the Oil Sands Development Policy.

Imperial proposed to dispose of the naphtha in overseas markets, which it considered as beyond reach, mentioning Japan as a possibility, or in other beyond reach markets.

Atlantic Richfield. Atlantic Richfield indicated that it would dispose of its share of the specialty oil and the naphtha in beyond reach markets in a manner similar to Cities Service.

Cities Service. Cities Service proposed to market the specialty low sulphur fuel oil in the Great Lakes area of the United States or as an alternative in eastern Canada. Cities Service contended that the low sulphur fuel oil markets in the Great Lakes area would greatly exceed volumes which Cities Service was required to dispose of and that such markets were ones in which local refineries, processing conventional oil, were no longer meeting the demand. It believed that marketing the fuel oil in this manner would satisfy the beyond reach criterion.

Cities Service proposed to dispose of the naphtha in a manner similar to that proposed by Imperial: overseas markets or other beyond reach markets.

Royalite. Royalite proposed to sell its share of the specialty oils and naphtha to The British American Oil Company Limited for marketing by displacement of imports or transfers of heavy

fuel oil to Ontario or possibly British Columbia. Royalite contended that this arrangement would constitute a beyond reach market.

British American anticipated it would dispose of the naphtha in beyond reach markets. Its studies indicated overseas markets could be developed.

(2) Views of the Interveners

Chevron. Chevron submitted that the reason the conventional oil industry was not serving the fuel oil market in Ontario was largely the price advantage of imported fuel oils. Chevron believed the applicants' evidence indicated that the 'specialty' synthetic oil would be competitive with imported product. Accordingly, Chevron contended that if fuel oil from oil sands sources could be marketed in the Ontario market, so also could fuel oil from conventional oil. Thus the Ontario fuel oil market was one which the conventional industry could be expected to serve equally well in terms of price as the applicants' product. With respect to quality, Chevron refinery experts were convinced that conventional oil could produce specialty oil of the same specifications as that proposed by the applicants at comparable cost. Chevron concluded that the conventional industry could expect to serve the specialty oil market in terms of quality specifications. Moreover, Chevron believed that the specialty oil markets were within the geographical reach of conventional crude oil. For these reasons, Chevron concluded that the market proposed by the applicants for specialty oils was not 'beyond reach'.

Chevron further submitted that the specialty oil constituted a good refinery feedstock having a value of $3.25 per barrel as catalytic cracker feed. Chevron considered that the differential between this value and an imported fuel oil price of $2.60 per barrel would constitute a strong economic incentive for the diversion of the specialty oil to a refinery feed. Chevron submitted that if the specialty oil were initially disposed in fuel oil markets, this movement would not continue for any appreciable length of time, given the economic incentives involved.

Banff. Banff stated it was not reasonable that a portion of the applicants' output be designated specialty oil and given exempt treatment under the Policy. Banff considered that the specialty oil referred to by the applicants was not unique and could be duplicated by Alberta conventional oil. Banff presented a preliminary design for manufacturing specialty oil from Rainbow area conventional oil and believed that, to be consistent with the applicants' logic, the output from the plant should be exempt from the prorationing system. In such circumstances, Banff contended that conventional oil producers should be allowed to build such plants and be accorded exemption from proration.

Banff contended that the markets designated by the applicants in Ontario were not clearly beyond the present or foreseeable reach of Alberta's conventional oil industry, if in the next five years Alberta oil were to reach Montreal and Chicago while markets for natural gas from Alberta moved further eastward. Banff submitted that the marketing of Alberta oil in Montreal would change

the situation with respect to usage of fuel oils, and that it was difficult now to know if fuel oils would be imported. Banff believed that economic incentives would direct that the specialty oil would be used as refinery feedstock rather than fuel oil and that under these circumstances the oil would displace Alberta conventional oil. Moreover, Banff believed that over the next five to 15 years there would be a reasonable possibility that conventional prorated Alberta crude oil might be pre-processed and marketed as heavy oil.

Banff's contention that all the proposed oil sands plant output was pre-processed refinery feedstock indicated to it that all the plant output of 80,000 barrels per day should be included within the Oil Sands Development Policy limits of 150,000 barrels per day. However, Banff agreed that if the markets for the specialty oil were clearly beyond reach, this procedure should not be followed.

Great Plains. Great Plains stated that if the specialty products were actually marketed in accordance with the intention of the applicants, the products would not directly or indirectly displace Canadian conventional crude oil. As such, Great Plains had no objection to the applicants' marketing plans for these products. However, it appeared to Great Plains that if the products were blended with the synthetic oil stream, a detrimental effect on the markets for conventional Canadian oil would be experienced.

Qualification for 'other' within reach Markets

Although the applicants' specific marketing plans related to 'new' within reach markets and beyond reach markets, both they and the interveners referred to the possibility of satisfaction over time of 'other' within reach markets in terms of trends in the life index. The views of the applicants and the interveners are summarized below.

(1) Views of the Applicants

The applicants presented estimates of Alberta's conventional crude oil life index corresponding to demand projections based on three postulated levels of United States overseas crude imports and the reserves forecast discussed in Section VIII. The demand figures presented on page VI-5 of the applicants' submission, adjusted to include only light and medium crude, constituted the lower demand forecast. These figures assumed that United States overseas oil imports as a proportion of total demand would increase from a historical average value of 16 per cent to 26.6 per cent by 1985. The other cases assumed United States overseas crude oil imports would satisfy constant levels of 20 and 16 per cent of overall demand.

Utilization of the lower demand figures and the applicants' reserve forecast results in a gradual decrease in Alberta's conventional oil life index from a current value of 31 years to 27 years in 1975 and 20 years in 1980. The applicants stated that the other assumptions would result in a 12 year life index by 1980 and 1976. The applicants subm tted that under the latter

case the application would satisfy the requirements of the Oil Sands Development Policy without providing 'new' within reach markets. However, they believed the levels of demand for Alberta oil assumed for this case were unlikely. Accordingly, the applicants did not seek to satisfy the marketing provisions of the Oil Sands Development Policy in terms of anticipated trends in the life index.

(2) Views of the Interveners

Chevron. In its submission Chevron presented estimates of Alberta's conventional crude oil life index predicated on the reserves forecast discussed in Section VIII and the demand forecast presented in the applicants' submission.[1] On this basis, Chevron forecast that Alberta's life index would decrease from a 1967 level of 28 years to 19 years by 1975 and 17 years by 1980. Chevron contended that the application should be deferred until the trend in Alberta's life index was estimated to approach 12 to 14 years within a five year period following approval of an application.

Dome. Dome calculated Alberta's conventional life index using essentially the same demand and reserves projections as Chevron. In its submission, Dome stated that Alberta's life index would not reach what it referred to as 'the more reasonable level' of 16 years until after 1980. It suggested that further synthetic crude oil production should be deferred, since the existence of a 20 to 30 year life index would not continue to encourage exploration for conventional oil.

---

(1) The demand forecast used by Chevron was not identical with that used by the applicants, since each made different adjustments to the submitted forecast to exclude pentanes plus and heavy crude oil. Also, the life index figures are not directly comparable, since Chevron's computations used beginning, rather than end, year reserves.

(3) Views of the Board

For purposes of clarification, the Board has summarized the marketing plans of the applicants in the table below. The Board has assumed the plant output would be as specified in the application.

Table XII-1

Applicants' Marketing Plan[1]

Company		Synthetic Oil	Specialty Fuel Oil	Naphtha
Imperial	Volume	15,000 b/d	7,500 b/d	1,500 b/d
	Disposition	Sell to Humble. Humble most likely market in Chicago area by exchange, processing agreement or at future Humble refinery.	Displace imports and transfers of heavy fuel oil in Ontario	Overseas or other markets
	Type of market	Likely NWR, possibility of BR	BR	BR
Cities Service	Volume	15,000 b/d	7,500 b/d	1,500 b/d
	Disposition	Sell to Cities Probably process at Chicago owned refinery or by exchange agreement in Chicago area.	Sell to Cities. Market in Great Lakes area of U.S., or possibly E.Canada.	Overseas or other markets
	Type of market	NWR	BR	BR
Atlantic Richfield	Volume	15,000 b/d	7,500 b/d	1,500 b/d
	Disposition	Exchange agreement, probably in Chicago area, or process in future owned refinery at Puget Sound.	Great Lakes area of U.S.	Overseas or other markets
	Type of market	NWR	BR	BR
Royalite	Volume	5,000 b/d	2,500 b/d	500 b/d
	Disposition	Sell to Gulf. Process at Gulf's Toledo refinery.	Sell to British American. Displace imports & transfers in S. Ontario and/or B.C.	Overseas or other markets
	Type of market	NWR	BR	BR

(1) NWR designates 'new' within reach markets.
BR designates beyond reach markets.

In appraising the marketing plan of the applicants the Board has initially considered whether the life index test, which relates to 'other' within reach markets, is likely to be applicable before 1980. The Board has then assumed that the applicants' intention is to market all of the synthetic crude oil in 'new' within reach markets and all of the 'specialty' oil in beyond reach markets. The former assumption excludes the contention of Humble that it might market its synthetic crude oil in 'beyond' reach markets. However, the Board believes this to be a reasonable treatment in view of the fact that Humble said disposition of the synthetic crude oil in new 'within' reach markets was more likely, and especially since no details were given on the beyond reach markets proposed.

(1) 'Other' within reach markets

The Board recognizes the uncertainties involved in projecting Alberta supply and demand and thus believes it prudent to consider a range of projections in appraising trends in the life index. Accordingly, four life index projections have been prepared predicated on varying supply and demand assumptions. The combinations of different supply and demand forecasts for the four cases are as follows:

	Reserves Forecast	Demand Forecast
Case 1:	Medium Projection, Table VIII-1, Section VIII	Table VIII-4, Section VIII (1)
Case 2:	As for Case 1	Case 1 incremented by 25%
Case 3:	'Low' forecast, Table VIII-1, Section VIII	As for Case 1
Case 4:	As for Case 3	As for Case 2

(1) Adjusted to relate to light and medium crude oil only.

The life index projections resulting from these cases are shown in Table XII-2.

Table XII-2

Comparison of Board Forecasts of Alberta's Conventional Oil Life Index (years)

	Case 1	Case 2	Case 3	Case 4
1967	32	32	32	32
1970	31	24	30	24
1975	26	20	24	18
1980	18	13	15	11

All the cases exhibit life indices in 1975 considerably in excess of the critical level of 12 to 13 years. By 1980, the critical level is reached under Cases 2 and 4. The Board notes that the assumptions embodied in Case 4 - the high demand and the low reserve forecast - are an unlikely combination.

On the basis of this analysis, the Board believes it improbable that the applicants would qualify for 'other' within reach markets in the mid-1970's. The Board sees a possibility that the life index test would be applicable before 1980, particularly

if additional requirements for foreign supplies in the United States induce a higher level of Canadian exports than that incorporated in the Board's forecast in Section VIII.

However, in appraising the current application the Board is primarily concerned with the likely situation in the first few years following the inception of production. As such, the Board believes that the life index test will not be satisfied within this period and that the application will have to qualify under the provisions of the Oil Sands Development Policy relating to 'new' within reach and 'beyond reach' markets. This is the same view as taken by the applicants.

(2) 'New' within reach markets

The Board has considered the applicants' plans for the disposition of the synthetic crude oil under each of the three sequential criteria of a 'new' within reach market as defined in the 1968 Oil Sands Development Policy statement as interpreted by the Board in Section V.

"A Market not being served today". In Section V, the Board interpreted this criterion as embracing all 'within' reach requirements for oil not satisfied by Canadian oil. The Board believes this criterion will be satisfied if the volumes of Canadian oil concerned are marketed by

(a) exchange or processing agreements which result in such volumes being additional to amounts of Canadian oil, if any, consumed at the refinery concerned, or

(b) processing at an owned or affiliated refinery of such volumes in excess of amounts of Canadian oil, if any, already consumed.

Inasmuch as all of the applicants envisaged arrangements which would be consistent with these provisions, the Board believes that the applicants' general plan meets the first criterion relating to the 'new' within reach markets.

"Markets over and above normal growth". The Board interpreted this criterion in Section V as involving the "accelerated acquisition of a market which might have been served equally well by Alberta conventional oil albeit at some indefinite time in the future. It may also involve the acquisition of a market which... may... be unlikely to utilize Alberta sources of supply in the foreseeable future."

In assessing the applicants' marketing plans under this criterion, the Board has made no distinction between 'new' markets which may be acquired by exchange or processing agreements or those which may be acquired by virtue of integrated or affiliated operations. The Board believes the relevant factor in all cases is the supply position of the refinery, or refineries, which eventually process the synthetic crude oil and associated conventional crude oil. In reviewing the status of an individual refinery, the Board identified three situations:

(a) the refinery would not be processing Canadian oil, and may be referred to as a 'new' refinery;

(b) the refinery would be processing Canadian oil, but over recent years at reasonably stable levels; and

(c) the refinery appears to be steadily increasing its degree of dependence on Canadian oil.

(a) In cases where the 'new' refinery is located in an area in which United States domestic supplies of appropriate quality are expected to continue to be available in adequate quantities, the Board believes that such a market qualifies as one 'over and above' normal growth. Under conditions where alternative domestic supplies are not readily available, as for instance would be the position of a 'new' refinery in the 'northern tier' area, the Board does not consider the criterion would automatically be satisfied.

(b) The Board believes that the principle underlying this situation is similar to that in the case of the 'new' refinery, and that the marketing of Canadian oil in excess of volumes currently processed will augment 'normal' growth.

The Board does not intend its interpretation of these two situations to indicate disagreement with certain interveners who suggested that the availability of Canadian oil in an area induces a continual expansion of markets. Rather, under current conditions the Board generally concurs with this latter concept but believes that the addition to normal growth initially occurs by virtue of an accelerated acquisition of the market.

(c) The Board does not believe that the satisfaction of requirements for a refinery which has shown a definitive trend towards increasing its dependence on Canadian oil can be treated as over and above 'normal' growth except under circumstances

where it seems likely that proprietary incentives in terms of transportation systems and production interests would tend to set an eventual upper limit on the level of Canadian oil processed.

Three of the companies involved in tbe disposition of the synthetic crude oil - Humble, Atlantic Richfield and Cities - indicated that their arrangements would embrace exchange or processing agreements with as yet unspecified refineries, but possibly located in the Chicago area, or 'new' refineries. They gave undertakings that the synthetic crude oil and an equivalent volume of Alberta conventional crude oil would be marketed in full accordance with the "over and above normal growth" criterion of the Oil Sands Development Policy. The Board accepts that the above companies have developed general plans which would meet the criterion. In reaching this conclusion, the Board has placed considerable weight on the undertakings given, and the ability of these companies to meet this requirement by virtue of their size, refinery locations and supply systems. As pointed out in Section XIII dealing with surveillance, a condition of any permit which might be issued would be that the applicants, before commencing production, file details of their plans which must conform with the general plans here approved.

Royalite's proposed marketing arrangements were specific and involved arrangements with Gulf who would use the oil in its Toledo refinery. The refinery clearly has been using increasing quantities of Canadian oil over the past few years and would be classified under refinery category (c). Gulf stated its pur-

chases of Canadian oil would stabilize in the absence of approval of the current application at a 'ceiling' of some 25,000 barrels per day, or thereabouts, in 1973. The Board notes that recent monthly nominations for Alberta crude oil have reached a level of 20,000 barrels per day and, given the historical trend, the Board sees every likelihood that the 25,000 barrels per day may be exceeded by 1973. Gulf made reference to extensive analyses which it had conducted concerning the optimization of its refinery operations including that at Toledo. It stated that it was on the basis of these analyses that it concluded there would be a ceiling on its use in Toledo of Canadian oil. Gulf undertook to process the volumes of oil required under the terms of the Oil Sands Development Policy over and above any amounts of Canadian oil processed at the time synthetic production becomes available. Therefore, the Board concludes that whether the 25,000 barrels per day level is reached in 1973 is irrelevant; the essential factors are Gulf's unequivocal statements that its usage of Canadian oil would approach a limit and, if the present application were approved, it would absorb Royalite's share of the synthetic crude oil and the matching conventional crude oil over and above what would otherwise be the limit.

As the Board sees it, and as Gulf has argued, the overall position of Gulf, with its extensive producing properties in the southern United States and its ownership interests in pipe lines which directly or indirectly supply northern portions of District II, is that Gulf's use of Canadian oil in Toledo will approach

a ceiling. Accordingly the Board considers it would be improper to treat the total oil requirements of Gulf's Toledo refinery as a 'normal' growth market for Canadian oil. Given the proprietary interests involved, the volumes of Canadian oil likely to be processed at Toledo in 1973, and Gulf's undertaking, the Board concludes that the Gulf proposal would create a market additional to 'normal' growth.

"Markets providing a net increase in the total market". The Board recognized in Section V that a market satisfying the first two criteria "nevertheless may not be classified as 'new within reach' if the absorption of Canadian supplies in such a market displaces, or precludes the normal growth in, Canadian supplies to other portions of within reach markets".

In the context of the present application, the main factor which may preclude qualification under the final criterion is the operation of the United States Oil Import Program. Each applicant agreed that the existence of restraints, in the sense interpreted in Section XI, on the importation of Canadian oil at the time the proposed plant came on stream would prevent satisfaction of the 'net' increase requirement of the Oil Sands Development Policy. The operation of restraints, even though informally applied, is tantamount to a quota type arrangement. Consequently, under a system where restraints apply, the increased imports proposed by the applicants may only be achieved at the expense of other imports of Canadian oil. The Board concurs that as long as a significant degree of restraint on the movement of Canadian

oil into United States markets exists, the applicants do not satisfy 'new' within reach markets as defined under the Policy.

In Section XI the Board has concluded that if the developments in Alaska are such as to result in production levels of the order of, or less than, 500,000 and 750,000 barrels per day in 1975 and 1980 respectively, the probabilities are that restraints on imports of Canadian oil to the United States will be eliminated within the period 1973 to 1975. Under these conditions the Board would accept that the marketing plans of the applicants would qualify under the "net increase" criterion and therefore fully qualify under the Policy as "new within reach" markets.

On the other hand should the developments in Alaska lead to production levels of the order of, or greater than, 1,250,000 and 1,750,000 barrels per day, the Board has found it improbable that imports of Canadian oil would be unrestrained by 1975. Under such conditions the Board could not accept that the applicants' marketing plans would qualify under the "net increase" criterion and therefore would find them to fail to qualify under the "new within reach" provisions of the Policy.

The applicants also suggested an alternative situation where the necessity for restraints may be eliminated by 1973 almost independently of the level of United States deficiencies by virtue of prorated conventional Canadian oil having reached its 'economic' penetration limit. The applicants said these circumstances would allow them to provide a net increase in the total market. The Board does not accept on this reasoning the contention that Canadian exports could reach their economic limit and

restraints be ineffective or removed by 1973. Furthermore, even if the contention were realized, the Board believes an increase in Canadian oil imports of some 100,000 barrels per day, as required to qualify the markets of the applicants as 'new' within reach markets, might well induce a reimposition of restraints which could result in restrictions for other Canadian oil importers.

(3) Beyond reach markets

Specialty Fuel Oils. All the applicants proposed to market the specialty fuel oils in beyond reach markets and, in particular, in heavy fuel oil markets of Ontario, British Columbia and the Great Lakes area of the United States. In Section V, the Board interpreted a beyond reach market as "geographically remote from within reach markets" or as a specialty market which may be geographically within reach but exists by virtue of price, quality or other reasons. Obviously, the applicants' anticipated markets for fuel oils would have to qualify as beyond reach under the specialty, rather than the geographically remote, criterion.

In its analysis of fuel oil markets of Section IX, the Board concluded that notwithstanding the existence of surplus crude oil producing capacity in Alberta, significant volumes of fuel oil would continue to be imported or transferred into Ontario and British Columbia in the 1970's. Therefore, the Board agrees with the applicants that this market constitutes a special 'beyond reach' market. The Board is satisfied that Imperial, and Royalite through The British American Oil Company Limited, will be able to displace imports and transfers of fuel oil in such

markets and thus that these companies' marketing plans satisfy the beyond reach criteria.

With respect to the proposals of Atlantic Richfield and Cities Service, the Board concurs that markets for fuel oils in the Great Lakes area of the United States would be available to these companies. Moreover, the Board has seen no evidence that would suggest to it that such markets will be served by Alberta conventional oil in the foreseeable future. Hence, the Board agrees with the applicants that these fuel oil markets qualify under the beyond reach criterion.

In reaching these conclusions, the Board had regard for the arguments of the interveners. It agrees with Banff and Chevron that fuel oil of specification and characteristics comparable to the applicants' product may be derived from Alberta conventional oil. However, as the Board sees it, the sole question is whether in the foreseeable future Alberta conventional oil will be supplying those portions of the fuel oil market in Ontario and British Columbia from which the applicants propose to displace imports and transfers, or fuel oil markets in the Great Lakes area. In the Board's opinion, neither the evidence at the hearing nor the Board's subsequent analysis indicated any likelihood that this would be the case. Accordingly, the Board does not accept the arguments of Banff and Chevron.

The Board also considered the argument of the interveners that economic incentives would impel marketing of the specialty oil as a refinery feedstock, rather than as a fuel oil. This

argument appeared to the Board essentially to concern the matter of surveillance. As such, it is discussed in Section XIII of the report.

Therefore, the Board is prepared to accept the contention of the applicants that they would be able to dispose of the specialty fuel oils in beyond reach markets. This conclusion would not be altered if in fact the volume of specialty fuel oil concerned is 30,000 barrels per day rather than 25,000 barrels per day, which the applicants indicate would be the case if they were unable to dispose of the naphtha in beyond reach markets.

Naphtha. If the naphtha production were marketed in overseas markets or in other markets clearly beyond the geographical limits of Canadian oil, the Board agrees that such arrangements would satisfy the 'geographically remote' aspect of the beyond reach market concept. If all or part of the naphtha production were marketed in geographical areas within reach of Canadian oil, the Board believes that whether such arrangements would qualify as beyond reach markets would depend on the actual circumstances involved. In the absence of further details from the applicants, the Board is unable to appraise this particular marketing possibility further at this time.

The Board also agrees that should the applicant be unable to develop geographically beyond reach markets, its plan to absorb the naphtha in the synthetic crude oil stream and increase the volume of fuel oil to 30,000 barrels per day would meet the requirements of the Policy.

XIII SURVEILLANCE

There are two distinct, though interrelated, aspects to the surveillance by the Board that might be expected if an approval of a scheme such as that proposed by the applicants were issued.

Firstly, because of the necessary time lag between the hearing of an application such as the subject one and the time at which the project might go into operation, the Board recognizes the virtual impossibility of all factors involved in a marketing plan being resolved at the time of the hearing, and consequently, if an approval were issued on the basis of satisfactory general marketing plans, the Board would expect the approval holder to provide full, definitive details of its markets, and to satisfy the Board that they were in accordance with his general plan on which the approval was based, at some time before production started. Secondly, there would be the periodic review by the Board during the operation of the scheme to ensure that the marketing operations of the applicant were in accordance with those he had proposed, or such variation of them as the Board might accept, and consequently, that the marketing operations remained within the Policy.

Discussion of surveillance at the hearing dealt with the second aspect of the matter and with possible measures to be taken if the Board should not be satisfied from such surveillance that a marketing of production was in accordance with the Policy.

(1) Views of the Applicants

Mr. Kieschnick, who appeared as the applicants' policy witness, stated that they would make every effort to provide, in such manner as the Board should require, corroboration so

it may finally determine whether or not the ultimate markets do satisfy the Oil Sands Development Policy. He said the requirement of an annual report would not be a problem, but acceptability of a provision for adjusting approval volumes if the Board was not satisfied regarding the markets would depend on whether there came out of the hearing an adequate test or corroboration of the concepts assumed by the applicants.

(2) Views of Canadian Fina

Upon examination Canadian Fina's witness, Mr. Harvie, expressed doubt as to the effectiveness of surveillance. He stated that, after a $200 million investment had been made and employment generated for a thousand employees, political pressures in the Province would work against a shut-down or partial shut-down of the proposed facility.

(3) Views of Chevron

On the subject of surveillance, Mr. Bristow testifying for Chevron stated, with regard to synthetic crude oil, that Chevron's position was that the applicants' market did not come within the Policy but that if the application should be granted it would be very necessary to provide for some adequate surveillance machinery. With regard to the specialty oil for the Eastern Canadian fuel oil market, he stated that effective surveillance ould remove Chevron's objection.

In Chevron's written argument, it submitted that while surveillance would be desirable, in practice it would be impossible -

there would be no way of determining whether a refinery within geographic reach would have processed Canadian conventional oil in absence of synthetic crude oil - it would be equally impossible to determine whether a specialty oil was being used as a fuel oil or as a refinery feedstock. Chevron stated that, as every proposed market other than that for fuel oil was outside Canada and beyond the jurisdiction of the Board or any Canadian governmental agency or court, there would be no way in which surveillance in the form of examination of transactions, confirmation of reports, and so on, could be exercised.

(4) Views of Dome

Upon examination, Dome's Mr. Dunkley expressed the opinion that from a practical view surveillance would be very difficult to implement.

(5) Views of Great Plains

In argument, Great Plains submitted that a continuing method of surveillance would be essential and should carry with it some effective method of restricting plant production if the products are not marketed in accordance with the Policy. It further submitted that

(a) Surveillance in the future must not be substituted for the obligation of the applicants to satisfy the Board at this time that the production will be marketed in accordance with the Oil Sands Development Policy.

(b) It may be extremely difficult to institute an effective method of surveillance.

(c) If it should appear necessary to cut off or restrict production from the plant for failure to market in accordance with the Policy, the Board would be under extreme pressure from the applicants to amend the terms of the approval.

(d) There might be extreme political pressure to keep the plant operating even though marketing was not in accordance with policy.

(6) Views of IPAC

At the hearing Mr. Booth stated that IPAC would not be concerned regarding the suggested surveillance provision as long as it was not employed as a substitution for the test at this time as to whether a market is a new within reach market within the Oil Sands Policy. This reservation was repeated in IPAC's written argument together with the statement that the role of surveillance was of a secondary, policing nature.

(7) Views of Mobil

In testimony Mr. Brown said that Mobil's doubt that the applicants' new markets would result in increased Canadian production would be reduced if an effective method of surveillance were devised. Mobil's argument, filed after the hearing, stated that the application should not be granted in absence of evidence showing clear and unequivocal prior compliance with the Policy, but subject to surveillance by the Board as to subsequent compliance. The argument also pointed out the impracticability and constitutional unforceability of such surveillance procedures.

(8) Views of the Board

The purpose of surveillance in both of the aspects referred to at the beginning of this section would be to ensure that the holder of an approval would carry out his marketing program in accordance with the Policy. The Board does not believe that the prospect that surveillance will be exercised can in any way relieve an applicant from the burden of demonstrating at the time of the consideration of his application that his production will be marketed in accordance with the Policy.

The Board recognizes that the actual marketing of products would occur in areas geographically beyond its jurisdiction and control. It also appreciates the argument of those interveners who pointed out the practical difficulty of shutting down or curtailing a project of the magnitude of that proposed by the applicants.

With regard to the difficulties the Board might find in determining if a product had gone to a market conforming to the Oil Sands Policy, it is the Board's view that such difficulties are more likely to arise in the case of a within reach market than in the case of the beyond reach market. However, if surveillance is proper in concept it should not be avoided because of such difficulties.

The Board notes that none of the interveners opposed surveillance provisions as such, although there was much uneasiness regarding the effectiveness of surveillance. Further, some interveners expressed the opinion that if an approval were

granted, surveillance would be necessary. As to the applicants, they had no objection to a surveillance provision so long as they would know what they were expected to show.

After a consideration of all of the views on the surveillance question, the Board believes that surveillance is necessary and that any approval that may be issued should include a provision requiring the applicants to report annually on the ultimate disposition of the products produced in the preceding year. However, such provision should not provide for automatic action if the Board is not satisfied that the products have been marketed in accordance with the Policy. The Board believes that, in view of the difficulties relating to its jurisdiction and the consequences of a shut-down of the proposed plant, the Board could best determine what action should be taken by an inquiry or public hearing when the circumstances should arise.

XIV FINDINGS

The Board having heard publicly the application under Part VIA of The Oil and Gas Conservation Act, 1957, of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Ltd., and having studied the evidence submitted by the applicants and the interveners at the public hearings, and having regard to the advice of its staff and to its own knowledge, finds as follows:

1. IN THE MATTER OF CONSERVATION AND RELATED ASPECTS

The present proposal of the applicants is for a sequence of mining, separating and upgrading operations which, subject to a condition pertaining to the initial tailings disposal operations, would result in satisfactory conservation and recovery of products from oil sands.

The applicants' plans for the disposal of liquid and gaseous wastes are satisfactory to the Board, subject only to the approval of the Department of Health of final design details.

Details concerning these matters and the nature of the condition proposed may be found in Section VII.

2. IN THE MATTER OF TECHNICAL FEASIBILITY

The present proposal of the applicants involves certain technical changes from their proposal of 1963. The Board believes that significant improvements have been made in each major process step and finds that there are no technical feasibility considerations that should stand in the way of the approval of the project.

Details of the processes and the technical improvements proposed by the applicants are presented in Section II, while the overall views of the applicants and the Board on these matters are presented in Section VII.

3. IN THE MATTERS OF ECONOMIC FEASIBILITY AND FINANCIBILITY

While the Board does not consider it to be its responsibility to rule in any absolute sense on the economic feasibility of the proposed project it considers the limited economic data submitted by the applicants, together with their preparedness to proceed with the project, sufficient evidence that economic feasibility considerations should not stand in the way of approval of the project.

The Board is satisfied with the applicants' ability to finance the proposed operation.

The above matters are elaborated upon in Section VII.

4. IN THE MATTER OF THE MARKETING PLAN

(a) The Proposed "New Within Reach" Markets

The market plans proposed by Atlantic Richfield, Cities Service and Imperial for their shares of the synthetic crude oil and the matching conventional crude oil, are by no means fully defined and rest primarily upon general commitments made by the proposed United States purchasers. In the case of Royalite, the plan to sell its share of the synthetic and matching conventional crude oil to Gulf Oil Corporation for use in its Toledo refinery, is more

specific but still dependent upon general commitments from the purchaser. However, recognizing the difficulties involved the Board is satisfied with the undertakings of the applicants, and that the markets would be ones not being served today and ones over and above normal market growth for Alberta oil in such market areas.

As discussed in Section XII, whether the proposed markets would also qualify as representing net increases in markets for Canadian oil depends upon the removal of Government restrictions on the import of Canadian oil into the United States. In turn, the probability of the removal of these restrictions by or about the time the operations proposed by the applicants would start, is, in the Board's view, critically dependent upon the level of production which may then be expected from Alaska. Thus, whether or not the proposed markets would represent net increases in the markets for Alberta oil depends upon the magnitude and rate of development of the recent discoveries in Alaska. Should these developments be of the order of the low estimate of the Board, the Board believes the deficiencies in United States supply in the period 1973 to 1975 would be such that the proposed markets would represent net increases in marke and would qualify under the "new within reach" criterion of the Oil Sands Development Policy. Alternatively

if the Alaska developments are more of the order of the high estimates of the Board the proposed markets would not now qualify.

(b) The Proposed Specialty Markets

The Board is satisfied that the specialty fuel oil markets proposed by the applicants are ones not now being served, and not likely in the foreseeable future to be served, by Alberta conventional crude oil. Accordingly, the Board finds that the applicants plan for the marketing of 25,000 barrels per day of specialty fuel oils conforms with the "beyond reach" criterion of the Oil Sands Development Policy. Should the applicants find it necessary or desirable to blend the proposed 5,000 barrels per day of naphtha production with the synthetic crude oil and produce and market 30,000 barrels per day of specialty fuel oils, rather than the 25,000 barrels per day, the Board agrees that this greater volume of fuel oil could also be marketed in conformity with the Policy.

(c) The Naphtha Market

The applicants' plans for the marketing of 5,000 barrels per day of naphtha in overseas or other geographically beyond reach markets, if realized, would conform with the "beyond reach" criterion of the Oil Sands Development Policy. If these plans were not

realized and the naphtha were blended with synthetic crude oil and 5,000 barrels of additional specialty fuel oil were produced instead, the Board agrees, as discussed in paragraph (b) above that this plan would also be in conformity with the Policy.

Full details of the applicants' marketing plans, the interveners views of them and the Board's analysis of these matters are given in Section XII with related material in Sections VIII, IX, X and XI.

5. IN THE MATTER OF SURVEILLANCE

Inasmuch as the granting of an approval would depend on the Board's having found that the marketing plans of the applicants are in accordance with the Oil Sands Development Policy, the applicants should be required to demonstrate in the future that they have adhered to such plans. Accordingly, any approval that may be issued should include a provision requiring the applicants to file with the Board full, definitive details of their markets before production is started and a provision requiring the applicants to report annually on the disposition of products produced in the preceding year.

The view of the applicants, the interveners and the Board on the matter of surveillance are discussed in Section XIII.

6. DISPOSITION OF THE APPLICATION

Having regard to its present findings with respect to the applicants' marketing plan the Board concludes that the application cannot be approved at the present time. The barrier

to immediate approval is the substantial uncertainly with respect to the probable magnitude and rate of development of the recent Alaskan discoveries. Since, in the Board's view, there is a fair possibility that these discoveries could result in a new United States supply of the order of the Board's high estimates of production from Alaska, the Board cannot now accept that the proposed "new within reach" markets would represent a net gain in market for Alberta oil.

Nonetheless, the Board does not think it proper, on the basis of the possibilities with respect to Alaska which are most difficult to resolve now, and which constitute the only barrier to present approval, that the application be denied or that the entire decision be further delayed. The applicants' case reflects their conviction that the Alaskan discoveries will not result in additional supplies being developed which will significantly affect their forecast of the United States deficiencies. The Board believes that results of exploration activity currently underway and planned for the coming winter may permit a more meaningful evaluation of the prospects in Alaska to be made in a few months' time.

The Board would be prepared, therefore, subject to the approval of the Lieutenant Governor in Council, to approve the application provided that:

> During the month of November 1969 at a public hearing called for the purpose upon eight weeks' notice following the filing of the applicants' sub-

mission, the applicants satisfy the Board that the balance of probabilities, as they may then best be assessed, strongly favours the applicants' contention that the probable Alaskan developments will be of the order of both those which they have forecast and which the Board has included in its low Alaska production case, and not such a degree greater as to reduce significantly the deficiencies now anticipated by the applicants in the United States indigenous supply of crude oil in the period 1973 to 1974.

In the event that the applicants do not file a submission to be considered at a November 1969 hearing, on or before September 5, 1969, the application would be deemed to be dismissed.

The approval which the Board would be prepared to issue following the November 1969 hearing, if the applicants satisfy the Board on the aforementioned matters and given the further approval of the Lieutenant Governor in Council at that time, would be in the form reproduced in Appendix C and subject to the terms and conditions therein shown.

Respectfully submitted,

G. W. Govier, P. Eng.
Chairman

A. F. Manyluk, P. Eng.
Deputy Chairman

Vernon Millard
Board Member

Dated at Calgary, Alberta
this 2nd day of December,
A. D. 1968

APPENDIX A

PART 1
(October 1962)

Government Policy Statement with respect to Oil Sands Development

Recently the Government authorized the first commercial development of the oil sands and other applications currently are pending.

The Government has an obvious responsibility to regulate the timing and the extent of oil sands production to protect the interests of the public as the owners of this resource and to ensure that the position of conventional oil production in Alberta is not jeopardized by the loss of already limited markets to a new source of supply. No economic advantage to consumers of oil products will accrue through the development of the oil sands since synthetic crude oil from the sands and conventional crude oil will, for at least some time, be competitive.

The conventional oil industry has invested nearly four billion dollars in exploration and development in Alberta and the impact of its operations is a major factor in the buoyancy of Alberta's economy. In addition, it generates over 40 per cent of total provincial public revenues. Obviously it would be detrimental to the public interest to permit unregulated development of an alternative source of supply to impair the economic soundness of the conventional oil industry by further

reducing its already limited market. This situation is aggravated by the fact that conventional oil is prorated to available market while oil from the sands cannot be so prorated because a constant plant through-put is essential to make such development economically feasible. Having regard to these circumstances, the policy of the Government will be to so regulate oil sand production that it will supplement but not displace conventional oil. At the same time, an opportunity will be provided for the orderly development of the oil sands within the limits dictated by the Government's responsibility to the public interest in preserving the stability of conventional oil development and the necessary incentive to ensure its continued growth.

For such production from the oil sands as may be able to reach markets clearly beyond present or foreseeable reach of Alberta's conventional industry, there is no need to restrict the rate of production from the oil sands and, provided the development program meets with the approval of the Oil and Gas Conservation Board, the Government will authorize it.

On the other hand, for such oil sands production as would be in competition with present or foreseeable markets for conventionally-produced Alberta crude oil, the impact on the conventional industry will be carefully considered. In this instance, the Government's judgment is that the best interests of the province will be served

(a) in the initial stages of oil sands development,

by restricting production to some 5 per cent of the total demand for Alberta oil - i.e. at a level of the order of that recently approved for Great Canadian;

(b) as market growth enables the conventional industry to produce at a greater proportion of its productive capacity, by permitting increments in oil sands production as recommended by the Oil and Gas Conservation Board, and on a scale, and so timed, as to retain incentive for the continued growth of the conventional industry; and

(c) by relating the scale and timing of increments of oil sands production also to the life index of proven reserves of conventional oil allowing the index to decline gradually from present levels but ensuring that it does not drop below 12 to 13 years.

This policy will afford flexibility in application and will ensure that the orderly development of the oil sands will proceed as rapidly as their production can be integrated into the over-all oil economy of the Province.

As the Government now sees the situation, total oil sands production probably will not exceed 200,000 barrels per day by 1975 and, depending upon the total oil demand and the capacity of the conventional industry, it could be less.

All plans for oil sands development require the approval of the Oil and Gas Conservation Board. The Government will look to the Board for assistance in implementing this general policy and for guidance should it become necessary to select among competing development proposals.

In short, it is the Government's intention to assure to the conventional oil industry a rate of production and a share of available markets in excess of what currently prevails and also to ensure that a reasonable share of future increased markets will be available to conventionally produced oil. This will still give scope for the orderly development of the oil sands under a regulated program that will protect the public interest by preventing detrimental dislocations in the Provincial economy.

PART 2
(February 1968)

Oil Sands Development Policy

In October, 1962, the Government announced its policy for the development of the Athabasca and related oil sands. The essential features of this policy are as follows:

(1) applications for oil sands production "able to reach markets clearly beyond present or foreseeable reach of Alberta's conventional industry" would be approved providing the development program meets the conservation and related requirements of the Oil and Gas Conservation Board and

(2) applications involving the marketing of oil sands production "within reach of Alberta's conventional industry" would

(a) for initial development be restricted to a volume in the order of five per cent of the total market for Alberta crude oil and

(b) for subsequent development be restricted to ensure that "market growth enables the conventional industry to produce at a greater proportion of its productive capacity..." and, with respect to the scale and timing of incremental oil sands production, by relating such production to "the life index of proven reserves of conventional oil ...".

The Government's intent in the policy was to provide for the orderly development of the oil sands in such a manner as to supplement but not displace production from the conventional industry.

There have been several developments since 1962 which have had an impact on the effectiveness and the interpretation of this policy.

In 1964 the Oil and Gas Conservation Board announced the adoption of a new proration plan which has had a significant effect on the development of reserves in the conventional industry.

As a result of the new plan a detailed re-appraisal of the crude oil reserves of the Province was carried out. This resulted in increases in the reserves of a number of fields, especially Pembina. The plan also has resulted in an increase in the incentive for the institution of enhanced recovery operations leading to higher crude oil recoveries.

Relatively few crude oil discoveries were made during the period immediately preceding the formulation of the Government's policy in 1962. In the subsequent years industry's exploratory efforts were more successful. In 1964 and 1965 discoveries were made in the Mitsue and Nipisi Gilwood Sand. In 1965 also the discovery in Rainbow brought about the Keg River oil play in Northwest Alberta. These latter discoveries added materially to the Province's crude oil reserves and it is expected that the Rainbow play will continue for several years.

The growth of the market for Alberta crude oil has been substantial but somewhat less than had been anticipated at the time of its appraisal in 1962. This has been due primarily to a higher than expected level of production in Saskatchewan. During the last year increased exports to the United States have brought the total market for Alberta crude oil very close to the level forecasted by the Board in 1962.

The impact of the re-assessment of older reserves, the institution of numerous enhanced recovery schemes, the new discoveries and the market circumstances have increased the life index for conventional crude oil from the 22 years of 1962 to a

current level of some 31 years, rather than to the 21 years previously expected.

In addition to the above developments substantial reserves of heavy hydrocarbons that have many similarities with the Athabasca type oil sands have been discovered in the general Cold Lake area. While the Oil and Gas Conservation Board recently has found these reserves to fall within the definition of "oil sands" in The Oil and Gas Conservation Act, the definition appears to require clarification. Moreover, the different definitions in various Provincial statutes require standardization.

During the last year the Government has received representations from some companies requesting both a clarification and modification of the existing policy. The Government asked the Oil and Gas Conservation Board to consider these matters. The Board did so and advised the Government that it believed certain aspects of the present policy should be clarified and that the policy should be amended in a manner which would encourage greater market growth than would otherwise occur and by this means enable further oil sands development without prejudice to the conventional industry. It considered these important in the long term interest of the Province in the development of its natural resources and to enhance its position as a major and growing source of petroleum supply on the North American continent. Further development would ensure that the Province would be able to take full advantage of market opportunities expected with the growing supply deficiencies in the United States, and enable it

to maintain its technological position as a source of synthetic crude oil having regard to potential developments elsewhere - especially in the oil-from-coal and the oil-from-shale programs in the United States. The Board suggested that certain clarifications and one amendment could be made in the policy without change in its broad intent and presented some preliminary proposals to achieve the objective.

The Government then asked the Board to discuss its preliminary proposals with representatives from the Alberta Division of the Canadian Petroleum Association and the Independent Petroleum Association of Canada. Following this discussion the Board advised the Government of the views of the various parties and in the light of them suggested certain amendments to its original proposals. The Government reviewed the amended Board proposals and on June 16, 1967, the Honourable Mr. Patrick and I discussed them in detail with an industry group representing the Alberta Division of the Canadian Petroleum Association, the Independent Petroleum Association of Canada and a number of individual companies interested in oil sands development. The Government has considered the views expressed at this meeting and the submissions which it received following the meeting and has now come to its decision.

The Government agrees with most of the industry and the Board that there are certain features of the present oil sands development policy that require clarification. Additionally, the Government believes that the policy should be amended to encourage

further growth in the total crude oil market and thereby permit further oil sands development.

The clarifications are as follows:

(1) The Government believes that the heavy oils of the Cold Lake type must be subject to the same policy as the Athabasca type oil sands. It takes this position because of the magnitude of the Cold Lake reserves in relation to conventional reserves, the similarity of the crude hydrocarbons themselves, and the probable similarity of in situ recovery methods for Cold Lake type heavy oils and Athabasca type oil sands. Moreover, the Government believes that regulation of the rate of production of the Cold Lake type heavy oils by the "approval" system used with oil sands is more practical than by pro-rating as is done with the light and medium crude oils. The lack of ready interchangeability among the heavy oils and the fact that by upgrading processes they, like the oil sands oil, could compete in the market for light and medium crude oil suggests serious problems if the regulation of production were based on proration to market demand. Consistent with this the Government has decided that the definition of oil sands should be amended in order to remove ambiguities. Furthermore, it believes that common definitions need to be adopted

in all Provincial statutes and regulations, thus ensuring a consistent mineral acquisition and development policy. The Government recongizes that because of the gradation in characteristics of the heavy oils it will be difficult to arrive at satisfactory definitions and that some arbitrariness will probably be necessary.

The Government believes that the best way of developing satisfactory definitions would be through the advice of a special committee composed of representatives from the Alberta Division of the Canadian Petroleum Association, the Independent Petroleum Association of Canada, the Department of Mines and Minerals and the Oil and Gas Conservation Board. The Board will be asked to convene such a committee.

(2) There needs to be clarification of what markets would be considered "beyond present and foreseeable reach of Alberta's conventional industry". The Government believes that the distinction between "within reach" and "beyond reach" markets should not be confined to a geographical one but that "beyond reach markets" should include any markets, including specialty markets, which Alberta's conventional industry is not now serving nor can reasonably be expected to serve in the foreseeable future because of price,

quality specification or other reasons. Decision in an actual case might be based on the recommendation of the Board following the public hearing of an application.

(3) With respect to an application proposing the marketing of oil sands production within reach of the conventional industry, but not in "new" markets as defined later, the Government believes that, as at present, the application should be approved only when indicated to be desirable on the basis of the trend in the life-index of the conventional industry. However, the criterion of per cent utilization of productive capacity referred to in the present policy is no longer useful and will be discarded.

(4) With respect to an application proposing the marketing of oil sands production in markets that are beyond reach of the conventional industry, the present policy is satisfactory and will be continued with such production being unrestricted so long as the development program meets the conservation and related requirements of the Oil and Gas Conservation Board.

(5) Under the present policy experimental operations in the oil sands, not involving commercial production, are encouraged and authorized by the Board and the Government without public hearing.

The Government believes it desirable that this be continued and, for clarification, points out that such operations may involve temporary production and marketing of oil sands products at levels considered subcommercial by the Board.

One amendment is made in the present policy. This is discussed in the following:

(1) The Government believes that in order to encourage greater growth in the total crude oil market than would otherwise occur and thereby permit further oil sands development, the present policy requires amendment with respect to the treatment of applications that provide for marketing a product from oil sands "within reach" of the conventional industry. Where it can be demonstrated that the applicant's marketing proposal would provide such additional growth by the development of a "new" market the Government is prepared to authorize further production of oil sands product at volumes equal to 50 per cent of the new market. A "new" market would be one not being served today; one over and above the normal growth in existing markets; and one representing a net increase in total market.

The Government believes that applications approved under this modification of the policy would provide the conventional industry with an immediate

share of markets which if otherwise obtained at all would have been obtained several years later. The modification, therefore, is unlikely to have any significant adverse effect upon the conventional industry.

It is recognized that during the next few years it is particularly difficult to estimate market growth. In view of this the Government believes it desirable to establish specific limitations on the additional volume of oil sands production that would be approved under this amendment of the 1962 policy.

Accordingly, the total volume of commercial oil sands production, including the presently authorized production, that will be permitted to enter new markets within reach of the conventional industry will be restricted to 150,000 barrels per day. Unless some wholly unforeseen set of circumstances should develop, this limit will remain in effect for five years. During this period the limit will be reviewed and, if conditions warrant, it may be increased for a succeeding period.

In addition to these matters relating to the circumstances under which additional oil sands production would be authorized, the Government also has given serious consideration to the question of the royalty payable to the Crown on products derived from bituminous sands or oil sands owned by the Province. Such

royalties are prescribed by regulation made under The Mines and Minerals Act, 1962. The Act authorizes the establishment of rates of royalty either of general application or with respect to any specified operation.

In January of 1963 Bituminous Sands Royalty Regulation No. 1 was established fixing the royalty payable until March 31, 1972, on the products recovered in the operation of Great Canadian Oil Sands Limited (45,000 barrels of synthetic crude oil and some 300 long tons of sulphur per day). The present royalty is based upon the value at the plant site of these products and the rate averages out at about 12 per cent on the synthetic crude oil and is 16 2/3 per cent on the sulphur. (The total royalty is equivalent to some 20 per cent of the value of the raw bitumen from which the synthetic crude oil and sulphur are derived.)

The Government has decided that when the present royalty arrangement with Great Canadian is reviewed, and in the case of any other commercial development of oil sands, it will express the royalty as one applicable to the raw bitumen recovered, at its value at the recovery site. This change in basis will result in comparable royalty treatment regardless of the extent of upgrading and will ensure that there will be no royalty incentive against extensive upgrading of the bitumen in Alberta.

Whether the future royalty rate on the raw bitumen will be altered from one which would yield the same return as under the present arrangements with Great Canadian will depend on future circumstances and whether any changes are found necessary in

royalty rates as they apply to the production of Provincially-owned oil and gas generally.

In considering the royalty rate expressed on the raw bitumen basis during the first term of a Crown lease, the Government would bear in mind the provision of the lease and The Mines and Minerals Act, 1962 relating to the maximum royalty rates applicable, during the first term of the lease, to the products derived from bituminous sands or oil sands. The total royalty would not exceed that which could be fixed under these limits.

Crown royalties applicable to crude oil produced from wells have in the past been set for periods of 10 years, the last regulation coming into effect on April 1, 1962. Accordingly, the next general review of royalty rates will be in 1972.

APPENDIX B

ATLANTIC RICHFIELD PRESS RELEASE REGARDING PRUDHOE BAY

ATLANTIC RICHFIELD-HUMBLE ARCTIC SLOPE DISCOVERY TERMED ONE OF WORLD'S LARGEST

PHILADELPHIA, July 18 -- An oil and gas discovery on the Arctic Slope of Alaska by Atlantic Richfield Company in a joint venture with Humble Oil & Refining Company has been described by a leading industry consultant as potentially "one of the largest petroleum accumulations known to the world today," Robert O. Anderson, Atlantic Richfield chairman, announced here.

DeGolyer and MacNaughton, Dallas, said, "In our opinion, this important discovery could develop into a field with recoverable reserves of some 5 to 10 billion barrels of oil, which would rate it as one of the largest petroleum accumulations known to the world today."

D&M added, "The major part of the field appears to lie on a 90,000-acre block of leases in which Atlantic Richfield Company and Humble Oil & Refining Company each owns a 50 per cent working interest. Two wells, seven miles apart, have been drilled to date on this block." The block, in the general area of Prudhoe Bay, is some 390 miles north of Fairbanks and 150 miles southeast of Point Barrow.

"The estimate of 5 to 10 billion barrels is a reasonable expectation for a structure of the size indicated by seismic

interpretation with the sand characteristics and saturation which have been shown by the productive intervals in the two wells," DeGolyer and MacNaughton said in a letter to Atlantic Richfield.

The D&M opinion was requested after coring and flow tests were obtained on the second well, the Sag River State No. 1, Anderson said. The well encountered 300 net feet of oil sand in the same Triassic formation found in the first well, Prudhoe Bay State No. 1, located seven miles northwest.

Anderson said that a flow test from perforations in the bottom 15 feet of the sand in the Sag River well flowed at a rate of 2300 barrels of 26.8 degree API gravity oil per day, with a gas-oil ratio of 635 to 1.

"Pour point of the oil from the test is minus 10 degrees Fahrenheit which means that we will be able to move it by pipe line during the very severe winters in that Arctic area," Anderson said.

Anderson said drilling will continue this summer on the Sag River State No. 1 until it reaches the lower formations found in the Prudhoe Bay State No. 1 and that a three-rig drilling program will begin on the block this fall. The Atlantic Richfield chairman announced that pipe line and transportation studies would begin immediately. "Commercial development of the field will require a minimum of three to four years," he added.

Atlantic Richfield, operator for the project, announced June 25 that the Sag River well had encountered oil in the

Triassic formation. At the same time, the company said the Prudhoe Bay State No. 1 flowed on a recent test at various rates up to 2415 barrels of 30.5 degree API gravity oil per day through perforations from 8656 to 8670 feet. Gas-oil ratio was from 570 to 1015 to 1. In addition, the Prudhoe Bay State No. 1 well produced gas at a rate of 40 million cubic feet per day from perforations between 8210 and 8250 feet. Both tests were made in the Triassic sand.

A previously announced test of the Prudhoe Bay State No. 1 showed a flow rate of 1152 barrels of oil per day from the Mississippian Carbonate formation at a depth of 9505 to 9825 feet.

# # # # #

D-102 7-18-68

APPENDIX C

PROVINCE OF ALBERTA
THE OIL AND GAS CONSERVATION ACT
OIL AND GAS CONSERVATION BOARD

IN THE MATTER of a scheme of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited for the recovery of oil sands, crude bitumen or products derived therefrom.

APPROVAL NO. ______

The Oil and Gas Conservation Board, pursuant to The Oil and Gas Conservation Act, being chapter 63 of the Statutes of Alberta, 1957, and with the approval of the Lieutenant Governor in Council numbered O.C. and dated (date to be determined) hereby orders as follows:

1. (1) The scheme of Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited proposed to be developed and operated on their behalf by Syncrude Canada Ltd. (which five companies are hereinafter collectively called "Syncrude"), for the recovery of oil sands, crude bitumen or products derived therefrom, taken from the area shown outlined on the attachment hereto, marked Appendix A to this approval, as such scheme is described in an application dated May 9, 1962 as amended to May 3, 1968, together with supporting material marked as exhibits and evidence adduced at the hearings of the application, is approved, subject to the terms and conditions herein contained.

(2) Subclause (1) does not preclude alterations in design or equipment compatible with the outlines of the scheme and made for the better operation of the scheme.

2. This approval applies to the recovery in each calendar year of 18,250,000 barrels of synthetic crude oil, 9,125,000 barrels of specialty oils and 1,825,000 barrels of naphtha, but for the period consisting of the part of the year following the date, as established by the Board, of commencement of essentially full-scale operations, and the next succeeding calendar year, the above volumes shall be increased by application of the factor equivalent to the number of days in the period divided by 365.

3. Prior to the commencement of major construction of the project facilities Syncrude shall

(a) satisfy the Board that it would be economically feasible to remove and satisfactorily dispose of the tailings and overburden from the initial tailings disposal area described in the application, in order that satisfactory recovery of the oil sands reserves of the area would ultimately be possible, or

(b) propose alternative or modified initial tailings disposal arrangements satisfactory to the Board such that the impairment of recovery of oil sands reserves would be minimized.

4. Syncrude shall satisfy the Board prior to (date to be

determined) that construction of the facilities required for the scheme has commenced, unless upon by application by Syncrude a later date is stipulated by the Board.

5. During construction of the proposed facilities Syncrude shall inform the Board on a quarterly basis of the progress of construction and shall obtain the approval of the Board concerning any major changes in design.

5. Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited shall, as soon as may be and before commencement of operations, file with the Board full definitive details, in conformity with the general marketing plans described in the application and at the hearing, and satisfactory to the Board, of the markets in which the synthetic crude oil, specialty oils and naphtha will be sold, including the refineries to which any such products will be delivered.

7. Upon completion of the construction of the facilities and prior to (date to be determined), Syncrude shall file such details of the project design or operating procedures as the Board may require.

8. The effective commencement of the recovery of saleable hydrocarbon products shall be before (date to be determined).

9. Syncrude shall measure materials mined and processed, intermediate and final products recovered and other plant streams as necessary, so that material balance and recovery calculations for the extraction, upgrading and related processes may be made with reasonable accuracy and frequency.

10. Syncrude shall furnish to the Board, in such detail and at such times as may be set by the Board, monthly reports of the quantity and assay of oil sands mined and the quantity of all intermediate and final products recovered therefrom.

11. After the commencement of mining operations, Syncrude shall report in the first three years on a semi-annual basis, and thereafter as required by the Board, the percentage of the crude bitumen in place in the mined area recovered during the report period, and details of the proposed mining and overburden removal plans for the succeeding period.

12. Atlantic Richfield Company, Cities Service Athabasca, Inc., Imperial Oil Limited and Royalite Oil Company, Limited shall file with the Board on or before March 31 in each year commencing with the year, 19 , a detailed report satisfactory to the Board on the marketing of the synthetic crude oil, specialty oils and naphtha produced during the preceding year, in conformity with the general marketing plans described in the application and at the hearing, including the refineries to which any such products were delivered.

13. There shall be no flaring or waste of liquid hydrocarbons produced except in cases of emergency, unless authorized in writing by the Board.

14. Syncrude shall carry out its operations to the satisfaction of the Board and in a manner that

(a) does not preclude or render more difficult the recovery of other oil sands recoverable by practical and reasonable operations,

(b) results in the mining of the practical maximum of all oil sands within the area being mined,

(c) results in the processing for the recovery of crude bitumen of the practical maximum of all oil sands mined,

(d) results in the recovery of the practical maximum of crude bitumen from the oil sands mined, and

(e) results in the recovery from the crude bitumen of the practical maximum of marketable products.

15. Syncrude shall carry out the solids disposal operations to the satisfaction of the Board, on lands to be approved by the Board, and in a manner that insures the stability of any tailings piles.

16. Syncrude shall dispose of any liquid wastes in a manner satisfactory to the Department of Health and the Board and in a manner that insures that no oily or contaminative materials flow over the land or into any body of water.

17. Syncrude shall convert any gaseous sulphur compounds, not converted to elemental sulphur, to sulphur dioxide and shall discharge them from stacks satisfactory to the Department of Health and to the Board.

18. Syncrude, in operations pursuant to the scheme, shall comply with the provisions of any applicable Act or regulation of the Province of Alberta now enacted or made, or that at any time hereafter may be enacted or made.

19. Where it appears to the Board that there has been a failure to comply with any terms or conditions of the approval, the Board may, in addition to any other remedy or proceeding to which it may resort, require the suspension of any operation carried on pursuant to the scheme.

20. This approval expires on (terminal date of 25-year term to be determined) unless the term of the approval is extended following a public hearing.

MADE at the City of Calgary, in the Province of Alberta, this day of , A.D. .

OIL AND GAS CONSERVATION BOARD

G.W. Govier
Chairman

APPENDIX A TO APPROVAL NO. _____

(This appendix, to be included at the time of issuance of the approval, would consist of a map of the lands leased by the applicants and for which approval is given for the mining of oil sands).